

United States Senate

HEALTH, EDUCATION, LABOR AND PENSIONS COMMITTEE

Edward M. Kennedy, Chairman

**Report on the August 6, 2007 Disaster
At Crandall Canyon Mine**



March 6, 2008

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INTRODUCTION

In the early morning hours of August 6, 2007, a large mountain “bounce” occurred in the Main West section of Crandall Canyon mine. “Bounce” is the technical term used to describe a collapse of this type in a mine, but it does not capture the force and explosive power of the event – “blast” would be much more apt. In such a powerful release of seismic energy, the coal in the pillars and walls of the mine, under extreme pressure, literally explode into mined out areas.

Notes taken by the first Mine Safety and Health Administration (“MSHA”) inspector to descend into the mine after the collapse graphically describe the massive force unleashed by the event:

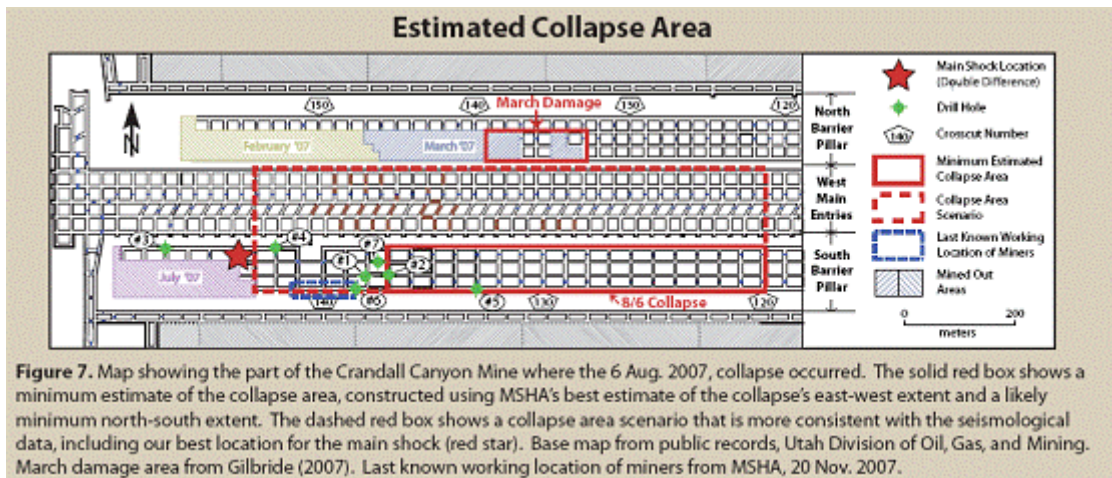
“roof bolts were sheared off...direction of force had come from the North.”

“some areas, coal was pulverized!”

“with the amount of rubble in the entries 5 to 6 ft deep, could anyone manage to survive the initial release of energy...” Exhibit 1.

The bounce registered 3.9 on the Richter scale. According to the United States Geological Survey, a seismic event of magnitude 4 is equivalent to detonating 15 tons of TNT. In this case, seismic records show that the blast lasted for *4 minutes*. Another inspector who examined the scene soon after the explosion wrote that mine walls were “blown as far as 45 ft. from origin!”

Six miners were working in the area at the time of the collapse: Kerry Allred, Don Erickson, Luis Hernandez, Juan Carlos Payan, Brandon Phillips, and Manuel Sanchez. All are presumed dead. Tragically, a second powerful bounce occurred on August 16, killing MSHA inspector Gary Jensen and miners Dale Ray Black and Brandon Kimber, all of whom were working on rescue operations at the time.



(Map from "Preliminary Seismological Report on the 6 August 2007 Crandall Canyon Mine Collapse," James C. Pechmann, Walter J. Arabasz, Kris L. Pankow, Relu Burlacu, Michael K. McCarter, Seismograph Stations and Department of Mining Engineering, University of Utah.)

This report does not examine the extensive and complex rescue effort which began on the morning of the collapse and effectively ended on August 31. Nor does it seek to determine the cause of the August 6 and August 16 fatal collapses. The Secretary of Labor has tasked an Accident Investigation Team with determining the proximate cause of these events – its work is ongoing. Instead, this report examines (1) how mine operating company Murray Energy Corporation ("Murray Energy") conceived, designed, and tested its plans to mine the barrier pillars in the Main West section and (2) MSHA's review of those plans and its monitoring of safety conditions during mining of the barrier pillars. These events stretch back a year prior to the accident to when Murray Energy purchased the mine in August 2006.

It is important to note that the mining operations proposed by Murray Energy, and approved by MSHA, at Crandall Canyon were among the most dangerous ever attempted. In a March 10, 2007 internal memo to Murray Energy CEO Robert Murray – one day before a near-tragic roof collapse in the North barrier pillar – company executive Bruce Hill wrote that "We are now approaching 2,000 feet of cover. **MSHA has never allowed pillar recovery at this depth.**" (emphasis added) Exhibit 2. Given the extreme risk posed by these mining operations, the mine operator, its technical consultants, and MSHA should have taken the most conservative, cautious approach possible.

The investigation has uncovered multiple failures in both the company's formulation and MSHA's review of the mining plans at Crandall Canyon. As conceived by the company and its technical consultant, Agapito Associates, the plans posed serious safety risks that were either ignored or not detected during the planning process. In addition, MSHA's review of the plans was neither complete nor sufficiently rigorous. Indeed, mining expert and former MSHA engineer Robert Ferriter described MSHA's review of Crandall Canyon's mine plan as a "broken system."

Even setting aside the plan itself, there were multiple warning signs during mining operations – such as heightened seismic activity and a major mine bounce in March 2007

– that should have raised red flags for both MSHA and the company. However, the company seems to have dismissed these warning signs and failed to bring them to MSHA’s attention (as they promised they would).

This report is not an attempt to rewrite history. Even if all of the flaws and mistakes in the plan review process had been corrected and safety monitoring was rigorous, we will never know whether mining in the South barrier would have gone forward and whether the collapses would have occurred. But our mine safety laws exist to ensure that, before miners are exposed to the massive, often unpredictable hazards of working underground, operators and regulators have done everything they can to minimize the risk of injury or death. Lapses, flaws, and mistakes of the type uncovered by the investigation cannot be tolerated.

EXECUTIVE SUMMARY: FINDINGS OF FACT AND RECOMMENDATIONS

Findings of Fact

1) The Crandall Canyon Mine Posed Significant Risks Prior to the Disaster

The record compiled by the investigation shows that Murray Energy was operating a dangerous mine in a potentially dangerous manner, was lax about or hostile to safety, and was bullying a compliant MSHA. Murray Energy's safety record is well below average and was poor at Crandall Canyon Mine in particular.

These problems resulted from a cavalier attitude towards safety among senior management. Many Crandall Canyon officials in the middle to lower ranks were vigilant about safety training and minimizing hazards, but several managers – including company's CEO, Robert Murray – showed a combative attitude towards MSHA enforcement, and sought to pressure MSHA inspectors.

An October 24, 2006 email about a meeting between MSHA officials and Robert Murray, highlights an example of such pressure:

Mr. Murray also got vocal on the issue of Tim Thompson having inspectors put a closure order on his longwall and that he complained to someone in Congress about it and that Mr. Thompson resultantly lost his job. Mr. Murray did state that he did not have Thompson fired, but that he would not stand by to be treated wrongly and would complain. Exhibit 3.

Unfortunately, on some occasions, MSHA officials buckled under the pressure, agreeing to "pull[] back on enforcement." Exhibit 4

At Crandall Canyon, Murray Energy was attempting one of the most hazardous types of mining – retreat mining under deep overburden, which subjects pillars being mined to extreme stresses.¹ In spite of these risks to miner safety, Murray Energy failed to (1) design and propose a mining plan that was as safe and conservative as possible and (2) take action to protect miners when it became apparent that mining conditions were rapidly deteriorating.

2) The Crandall Canyon Disaster Raises Serious Questions About Every Level of the Plan Formulation and MSHA Review Process

This report focuses on Murray Energy's mining of the North and South barrier pillars in Main West and MSHA's review and approval of the company's mining plans. The August 6 accident occurred in the South barrier pillar, but Murray Energy had been mining in the Main West area for almost a year. A full understanding of these prior mining activities and accompanying seismic conditions is essential to a realistic

¹ Retreat mining (also known as "pillar extraction," "pillar recovery," "pulling pillars," or "robbing pillars") refers to the practice of removing all or part of the pillars left after room and pillar mining has been completed. "Removing support during retreat mining can lead to roof falls, so the pillars are removed in the opposite direction from which the mine advanced: hence the term 'retreat mining.'" (http://www.uky.edu/KGS/coal/coal_mining.htm) "Overburden" or "cover" refers to the amount of rock above the area being mined. Greater overburden translates to greater stress and pressure on the coal pillars supporting the roof.

assessment of the factors that led to the August 6 tragedy. The investigation has uncovered evidence of multiple failures in the company's formulation, and MSHA's review, of plans to mine the barrier pillars

a) The Initial Plan Should Not Have Been Proposed

The plan, conceived and designed by the company and its technical consultant, Agapito Associates, posed serious safety risks that were either ignored or not detected during the planning process.

- During the formulation and review of the plan, Murray Energy and MSHA either ignored or missed important facts about the mine's safety history that were clearly relevant to a safety assessment. Before Murray Energy purchased Crandall Canyon, both the mine's previous owner, Andalex Resources, and federal officials considered the Main West area too dangerous for retreat mining and decided to seal it. During a visit to the mine to consider the request to seal it, a Bureau of Land Management ("BLM") inspector noted hazardous safety conditions in Main West.² The prior owners also submitted a mine plan to the Utah mine regulatory agency describing how barrier pillars – which Murray Energy later proposed to mine – would be left to guarantee stability.
- The investigation has found serious flaws in the reports by Agapito Associates, Inc., which the company and MSHA heavily relied upon in determining that the mining plans were safe. As a result, the roof control plan and MSHA's subsequent review of the plan were compromised by flawed and overly optimistic safety assumptions.
 - **The record shows that Agapito's work was flawed in multiple respects and "unconservative,"** according to a post-accident analysis by expert mine engineers at the National Institute for Occupational Safety and Health. Exhibit 5.³
 - **Evidence in the record indicates that Agapito relied on incorrect mine depth data, leading it to miscalculate the overburden** in the retreat mining areas. Precise calculation of overburden is needed to accurately assess the risk of pillar extraction, since the pressure on pillars intensifies as the overburden increases.

b) The Initial Plan Should Not Have Been Approved

² It is important to distinguish between the "mains" in Main West and the barrier pillars protecting the mains. "Mains," also known as "Main Entries," are roads or shafts in a coal mine that serve as primary roads for haulage and the main ventilation supply. Thus, the references above to pillars in Main West refer to the pillars holding up the roof in these main tunnels, not the barrier pillars on each side of the mains that Murray Energy later mined.

³ "Evaluation and Control of Coal Bumps," September 28, 2007, Office of Mine Safety and Health Research, NIOSH, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. Exhibit 5

MSHA did not rigorously or thoroughly review and test the proposed plan and Agapito's technical analyses supporting it. In the one instance where an MSHA employee did thoroughly evaluate Agapito's work, his conclusions were rejected by MSHA supervisors after conversations with Murray Energy officials.

This record demonstrates the need for (1) the use of more cautious and conservative engineering assumptions in safety analyses of deep cover mining, and (2) more rigorous and thorough review by regulators of technical analyses submitted by mine operators.⁴

c) The Plan Should Not Have Been Pursued As Conditions Worsened

The company ignored multiple warning signs during mining – including heightened seismic activity and a major mine bounce – that should have raised red flags about safety conditions.

During mining of the North barrier pillar in early 2007 – just 900 feet from where the August 6 tragedy occurred – there were multiple signs of instability:

- A February 7 report describes “unpredictable rolling out rib conditions...in Main West.”⁵ Exhibit 6
- During the retreat mining, a March 7 report by a shift foreman states that the mine was “bouncing real hard on occasion. Smacked little Carlos up aside of the haid [sic] with a pretty good chunk.” Exhibit 7.
- A March 10, 2007 internal memo conclusively establishes that company management, including CEO Robert Murray, was aware of the instability in the North barrier pillar. The memo to Murray stated that “The mine is experiencing heavy bouncing and rib sloughage.”⁶ Beside this description, Murray wrote “noted.” Exhibit 2.
- On March 11, a large bounce occurred in the North barrier and damaged nearly 800 feet of the mine, leading Murray Energy to abandon the area and seal it. The record strongly suggests that the law required the company to formally report the incident, but the company failed to do so.

⁴ NIOSH and MSHA classify “deep cover” mines as those in which more than 750 feet of rock (in mining terminology, “overburden”) lie above the mining face. Crandall Canyon Mine falls within this category since, at its deepest point, the mine lies below 2,200 feet of rock.

⁵ Ribs are the walls of tunnels in underground coal mines. More technically, ribs are the side of a pillar or the wall of an entry.

⁶ Ribs or pillars “slough” coal when coal falls off or slides down the wall onto the floor of the entry. Mine experts recognize sloughage as a sign that the pillar or rib is being subjected to stress or pressure from the rock overlaying the tunnel (known as “overburden” or “cover”). *See, e.g.*, Improving Safety At Small Underground Mines, Robert H. Peters, Bureau of Mines, 1994, found at <http://www.cdc.gov/niosh/mining/pubs/pdfs/sp18-94.pdf> (“Normally stable pillar line conditions often deteriorate if the pillar line moves slowly or remains idle for an extended amount of time. This deterioration can manifest itself in the form of excessive sloughage, heave, and squeezes....When the pillar line moved slowly or remained idle over the weekend or during a miner’s vacation, normally stable pillars began to take weight, as evidenced by sloughage...”).

- BLM Inspector Falk reported serious concerns about retreat mining after visiting the mine in December 2006 and February 2007, but these concerns apparently were not shared with MSHA. Exhibit 8.
- A June 5, 2007 memo reported “constant bumping and sloughing of the ribs.” Exhibit 9.
- An August 3rd update memo to Mr. Murray verifies that the company expected instability as they retreated under deep cover and that “significant sloughage is occurring” during pillaring, a sign of stresses on the pillars. Exhibit 10
- Miner Dale Black (who perished in the August 16 tragedy) told MSHA inspector Donald Durrant that, prior to the August 6 collapse, “there was heavy bumping and there were days he had some concerns.”⁷

MSHA also failed to heed warning signs of instability and poor safety conditions during mining of the barrier pillars. After the major collapse in March, MSHA should have visited the mine immediately to (1) determine whether the bounce was reportable (and thus whether the company should be cited for its failure to officially report it), and (2) assess the safety of continued mining in the South barrier pillar. MSHA officials justified their failure to investigate on the grounds that the incident did not seem reportable or significant, given the company’s account. This reliance on representations of the mine operator does not satisfy MSHA’s regulatory and monitoring obligations.

In addition, when Agapito Associates revised its assumptions after the March collapse, MSHA failed to rigorously review Agapito’s revised findings. The agency did not submit the plan to MSHA’s Technical Support Center for review because it would take too much time. The agency was also under pressure from the company to approve the plan quickly – which it did.

The investigation has also uncovered disturbing information showing that, in May 2006, MSHA officials entered into an improper agreement with Murray Energy in which MSHA relaxed the reporting requirements of the law – excusing the company from reporting seismic events as the law requires.

3) Evidence Indicates that Murray Energy Violated the Mine Plan, Making a Bad Situation Worse

It is impossible be certain what happened in the moments before the August 6th collapse. However, the investigation has uncovered evidence indicating that, at the time of the collapse, the company was mining in a manner *specifically prohibited* by MSHA.

⁷ Interview with Donald Durrant, October 10, 2007. Durrant said that generally, during his Main West inspections, there were “some roof issues.” But as a rule, he said, the mine roof and floor were very strong. However, Durrant said he had concerns about mining the barrier pillars in Main West. Specifically, he was “concerned about additional tunneling because of the weight the barriers would be supporting.”

RECOMMENDATIONS

The investigation demonstrates that the Department of Justice must get involved and that there is a need for significant reforms in the process of formulating, reviewing and approving mine plans:

1. **The Secretary of Labor Should Refer the Case to the Department of Justice For Prosecution.**

The record shows that Murray Energy failed to exercise care and caution in formulating the mine plan, disregarded increasing signs of danger in the mine, failed to tell MSHA about these dangers, and violated the mine plan in a way that put miners in danger. Murray Energy's actions must be fully investigated and those who broke the law must be prosecuted to the fullest extent of the law.

2. **Additional Requirements For Roof Control Plan Review Process**

The failure of the review process at Crandall Canyon Mine highlights the urgent need for reform and strengthening of the review process for mining plans— particularly for deep cover mines. Such reform must (1) codify the required steps in the roof control process more explicitly, (2) require in-depth review and analysis, by both mine operators and MSHA, of proposed mining plans and supporting engineering studies, and (3) insulate the process from inappropriate industry pressure or influence.

Such reform should require the following:

- **When proposing mining plans or revisions in mining plans, the mine operator should create a detailed historical record of safety conditions at the mine.** This record should include a review of the mine's safety record and history of seismic disturbances or instability. MSHA should review and analyze this record for accuracy through site visits and a review of mine safety documents, MSHA citations and standards violated, and any other relevant materials.
- **MSHA should review all technical and engineering analyses submitted by mine operators in support of roof control plans or amendments.** At a minimum, the technical review should include checking the results of computer analyses by: 1) verifying the validity of all input data; 2) ensuring the use of a modeling program approved by NIOSH for mine design; 3) validating all dimensions, geologic information and material strength properties; and executing multiple computer runs by varying model input parameters to provide a parameter-sensitive risk assessment of the proposed mine design. In addition, for plans involving retreat mining, all plans and technical and engineering analyses should be submitted to the Roof Control Division of MSHA's Safety and Health Technology Center, which will generate a risk assessment of the plan and make a recommendation of approval or disapproval.
- **The mine operator should create a formal, comprehensive risk assessment of the proposed roof control plan or amendments.** This risk assessment should assess the level of risk to miners in each component of the plan or plan

amendment in light of (a) the detailed record of safety conditions discussed above, (b) all technical and engineering analyses submitted, (c) potential safety hazards posed by the mining plans, and (d) any other factors deemed relevant by the Secretary or the District Manager. MSHA should review and analyze this record for accuracy through site visits and a review of mine safety documents, MSHA citations and standards violated, and any other relevant materials.

Each of the documents described above should be submitted as part of the Uniform Mine File and posted on the MSHA website. The Secretary should also revise MSHA's Program Policy Manual and any other MSHA internal guidance to incorporate these new requirements.⁸

3. Technical Analyses of Retreat Mining

The Secretary, in consultation with NIOSH and the Safety and Health Technology Center, should promulgate regulations establishing uniform methods, requirements and parameters for technical analyses of retreat mining, including

- **A list of acceptable software or other analytical tools** (such as the ARMPS or LAMODEL software packages) that NIOSH deems of sufficient quality to be accepted by the Agency in mine plan submissions;⁹
- **A list of approved methods of operating or applying these tools.** Such approved methods should (a) specify acceptable parameters and other inputs to be used (or ranges for those parameters or inputs) and (b) where parameters and other inputs are based on site-specific data, establish approved techniques for determining such site-specific data.
- **Minimum stability factors (for both barrier pillars and production pillars), calibrated for various depths, for retreat mining plans.**¹⁰ The Secretary should direct all Agency personnel to reject retreat mining plans where pillar stability factors are not equal to or greater than these minimum stability factors, unless the mine operator submits a petition under section 101(c) of the Federal Mine Safety and Health Act of 1977, using site-specific data collected through approved techniques and the petition is approved by the Safety and Health Technology Center as not exposing miners to unusual dangers.

In consultation with the Safety and Health Technology Center and NIOSH, MSHA should formulate a Roof Control Handbook (similar to the MSHA Ventilation Review

⁸ For example, item 4 under "Management System Controls" in section V.G-4 of the Program Policy Manual should be revised to include a requirement that MSHA re-run software or other engineering tools used to assess mine safety.

⁹ ARMPS (Analysis of Retreat Mining Pillar Stability) and LAMODEL (Laminated Model) are displacement discontinuity computer models used by mine engineers to calculate mine stability factors and measure stress and displacement.

¹⁰ NIOSH distinguishes between "'production pillars' that are within the mining panel" and "'barrier pillars' that isolate individual panels from adjacent mined out areas." Exhibit 5.

Handbook) that contains guidelines for MSHA personnel charged with reviewing roof control plans and amendments.

In order for the Safety and Health Technology Center to perform its expanded responsibilities with the necessary independence, the Directorate of Technical Support should report directly to the Office of the Assistant Secretary for Mine Safety and Health (in the same way that Coal Mine Safety and Health and Metal/Nonmetal Mine Safety and Health departments now report).

4. Monitoring Of Retreat Mining

- **In all mines where retreat mining is used, the mine operators should be required to make a weekly written report on safety conditions.**
- **MSHA roof control specialists should visit such mine at least monthly during these operations to assess conditions, and file a report on each visit as part of the Uniform Mine File.**

5. Minimizing, and Tracking, Contacts with Mine Operators During The Review Process

The experience at Crandall Canyon demonstrates that MSHA's review and approval process must be more carefully protected from pressure or influence by mine operators. The "Mine Plan Approval Procedures" section of MSHA's Program Policy Manual attempts to address this concern,¹¹ but the procedures are inadequate.

- **The Secretary should promulgate regulations to monitor and centralize communications with mine operators.** Specifically, mine operators who wish to contact any Agency official involved in the review process, during a period in which the operator has a proposed mine plan or amendment pending before the Agency, should do so only through a designated Agency liaison. The liaison should keep detailed records of all contacts with the mine operator during this period. The designated liaison can be an existing MSHA official – such as the Assistant District Manager or Engineering Coordinator.
- **The Secretary should specify penalties that will be imposed on mine operators for failure to follow these regulations and, if warranted, appropriate disciplinary action should be taken against MSHA personnel.**
- **The Secretary should design and implement a system in every district office for tracking contacts between mine operators and Agency**

¹¹ A subsection on "Management System Controls" instructs districts that: "Contacts by the District with mine operators to request additional information should be limited to specially designated MSHA personnel, or a specially designed system." Found at <http://www.msha.gov/REGS/COMPLIAN/PPM/PMMAINTC.HTM>

personnel at all times, even when no plan or amendment is pending with the District office.

6. Enhance Communication With Other Agencies

If MSHA and BLM had communicated in late 2006 and 2007 about safety conditions at Crandall Canyon, the tragedy of August 2007 might have been avoided or mitigated.

- **To correct this lack of communication, each MSHA district should create an interagency mine safety task force comprised of representatives from each federal government agency involved in monitoring, regulating, or inspecting mines in the district. The Secretary should also urge state and local agencies to participate.** The task force should meet at least quarterly to share all information relevant to safety conditions at mines in the jurisdiction. MSHA should also consult task force members whenever an amendment to the mine plan is submitted. Task forces may meet by telephone or other means.

In addition to working group meetings, agencies represented in the working groups should exchange documents and information on health and safety conditions at the mines under their jurisdiction. Such documents and information should include, for example, MSHA citations and information about rule violations, BLM reports containing safety observations, and inspection reports by state agencies.

7. Strengthening Accident Reporting Requirements

The Secretary should amend Part 50 of Chapter 30 of the Code of Federal Regulations to clarify reporting requirements in the event of any seismic disturbance. Specifically, such regulations should require that if a seismic disturbance or other event compromising stability (including a bounce, bump, floor heave,¹² outburst, or roof fall) occurs, and mining activity stops for more than one hour within six hours after the disturbance or event, the disturbance or event should be a reportable “accident” under 30 CFR 50.2(h).

The Agency should undertake an investigation within 10 days of becoming aware of facts at a mine that, considering the history of seismic activity, geological characteristics, and safety record of the mine, would lead a reasonable person to believe that it is more likely than not that a seismic disturbance of the type described above has occurred at a mine.

MSHA should investigate *every* seismic disturbance or event of which it becomes aware in areas of a mine where retreat mining is being used. This investigation need not initially involve a site visit. For example, MSHA officials can interview mine officials about the event and ask for log books describing the incident to be provided immediately.

¹² A “floor heave” is upward movement of a coal seam floor under pressure from adjacent coal pillars.

I. THE CRANDALL CANYON MINE POSED SIGNIFICANT RISKS PRIOR TO THE DISASTER: MURRAY WAS OPERATING A DANGEROUS MINE IN A POTENTIALLY DANGEROUS MANNER, WHILE BEING EITHER LAX OR HOSTILE TO SAFETY AND BULLYING A COMPLIANT MSHA

The August 6, 2007 collapse at Crandall Canyon mine occurred in the South barrier pillar of the Main West section of the mine. At the time of the collapse, the mining crew was conducting retreat mining in the barrier pillar at approximately crosscut 139.¹³ The following section describes the mining techniques used at Crandall Canyon and the nature of the mining activities undertaken in the year prior to the accident.

A. Crandall Canyon Is a Deep Cover Mine -- Deep Cover Mines Are More Dangerous

NIOSH defines deep cover mines as those with overburden greater than 750 feet. Crandall Canyon Mine falls within this category since, at its deepest point, the mine lies below 2,500 feet of rock. Exhibit 11

Underground coal mining is generally conducted in one of two ways: room and pillar or longwall mining. In room and pillar mining, a machine called a continuous miner drives tunnels (known as “entries”) into the coal seam, leaving behind pillars to hold up the roof. As mining advances, a grid of entries and pillars is created. Murray Energy used the room and pillar method to mine the North and South barrier pillars of the Main West portion of Crandall Canyon mine, which is the focus of this report.

Mining in deep cover mines, especially room and pillar mining and pillar extraction (examined in detail below), is recognized as more hazardous since “greater depth means higher stress, both vertical and horizontal.” NIOSH has noted that “analysis of MSHA statistics indicates that deep cover pillar recovery accounts for a disproportionate share of the underground coal mine roof/rib fatalities and injuries.” Specifically, since “1997, deep cover...pillaring operations have accounted for 40% of the fatalities which have occurred during pillar recovery.”¹⁴ It is widely recognized in the mining community that, as currently available coal fields are exhausted, mines will be forced to go deeper in order to recover coal reserves.¹⁵

¹³ A crosscut is “a passageway driven between the entry and its parallel air course or air courses for ventilation.” <http://www.coaleducation.org/glossary.htm>

¹⁴ Reducing the Risk of Ground Falls During Pillar Recovery, C. Mark, F. Chase, D. Pappas, NIOSH, December 2003. Exhibit 12.

¹⁵ See, e.g., Deep Cover Pillar Extraction in the U.S. Coalfields, F. Chase, C. Mark, K. Heasley, NIOSH, August 2002 (“Deep cover retreat mining...is an important emerging issue which will intensify in the future as more easily mined shallow seam reserves are depleted.”) Exhibit 13.

B. Retreat Mining Is Dangerous

Retreat mining (also known as “pillar extraction,” “pillar recovery,” “pulling pillars,” “barrier removal,” or “robbing pillars”) refers to the practice of removing all or part of the pillars left after room and pillar mining has been completed. “Removing support during retreat mining can lead to roof falls, so the pillars are removed in the opposite direction from which the mine advanced: hence the term ‘retreat mining.’”¹⁶ In many retreat mining plans, including the Crandall Canyon plan, the plan is designed to provide for a controlled roof collapse (or “cave”) as pillars are removed. To support the roof during retreat mining, the Crandall Canyon roof control plan called for the use of Mobile Roof Support devices (“MRS”), mobile lifts that support the roof from floor to ceiling.

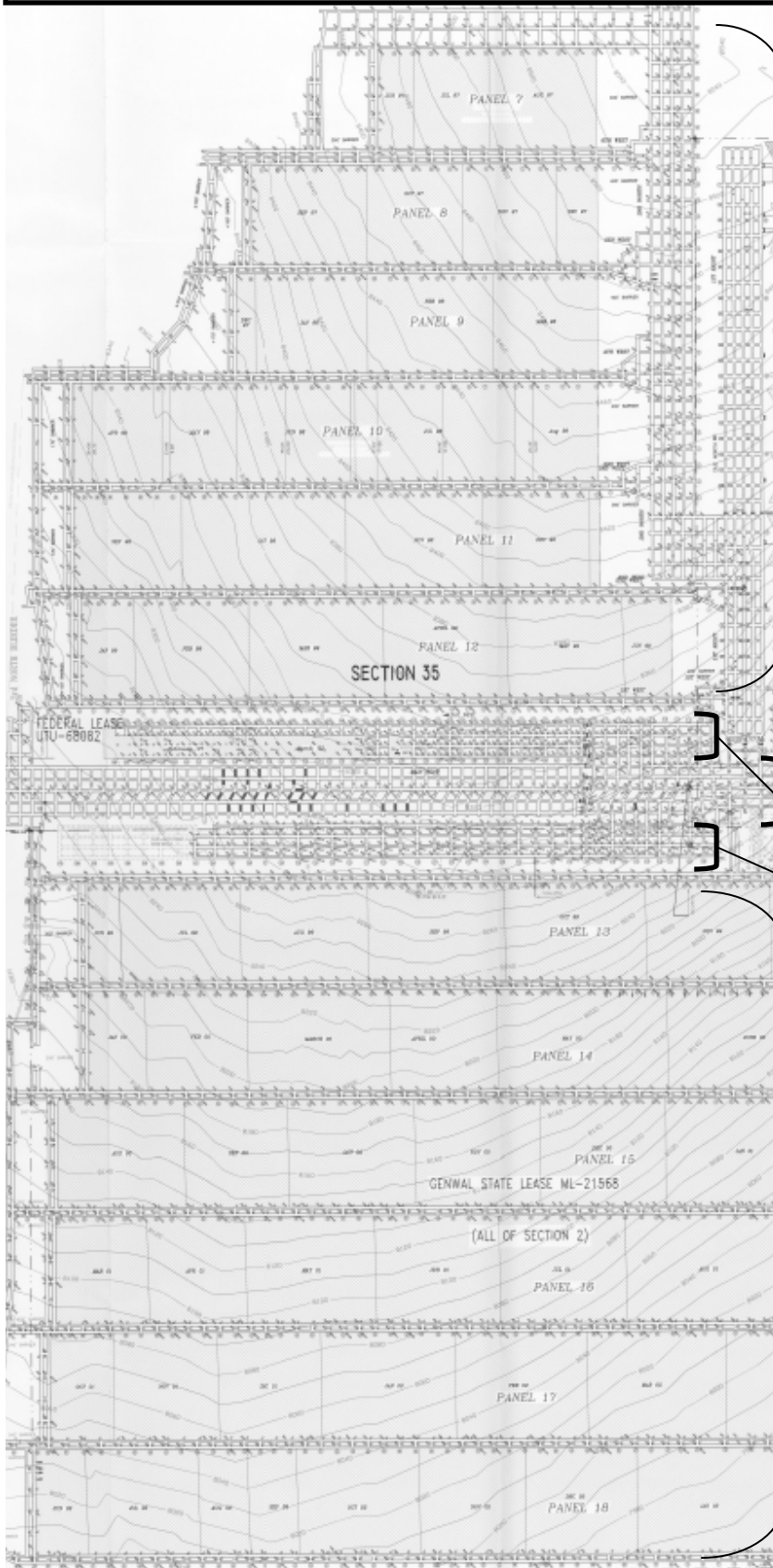
The other mining technique, longwall mining, employs very large mining machines to extract large blocks of coal (known as “panels”) from the coal face. As the longwall machine advances along the face, the roof behind the machine collapses in a controlled manner. The roof in the immediate vicinity of the longwall machine is supported using a complex system of hydraulic shields, which move forward in coordination with the machine’s advance and provide a safe working area for miners.

A successfully “mined out” section of an area where longwall mining has occurred (a “longwall panel”) is known as a “gob,” where the roof has collapsed in a controlled manner. Gobs are typically filled with waste and rock strata. While this report focuses on the room and pillar mining, and subsequent full pillar extraction, in the North and South barriers, longwall mining is relevant because it occurred adjacent to the North and South barriers and placed mining induced loads on both barrier pillars.

For most of its productive life, the Main West section was the site of extensive longwall mining. The mine map excerpt below shows how the main tunnels in that section served as the ventilation, haulage way, and main “road” to service longwall mining north and south of these mains. As can be seen from the map excerpt, longwall panels 7 through 18 were mined from 1997 to 2003.

¹⁶ Kentucky Geological Survey, University of Kentucky, Methods of Mining, http://www.uky.edu/KGS/coal/coal_mining.htm

CRANDALL CANYON MINE, MAIN WEST SECTION (AS OF JULY 2, 2007)



“Mined out” longwall panels with no remaining coal or roof support. Pressures from these vast empty areas are transferred to barrier pillars

Main tunnels (used for haulage, transport)

North and South Barrier pillars (shown after mining). Along with the old pillars in the Main Tunnels, these barrier pillars were the only support for the roof in Main West.

“Mined out” Longwall Panels

As longwall panels are mined, the roof inby¹⁷ the longwall collapses in a controlled manner, creating gob areas. The overburden loads that were originally borne by the unmined coal are transferred to other areas, which mine designers must protect from these additional loads. At Crandall Canyon, massive barrier pillars, approximately 450 feet wide, between the mains and the longwall panels in Main West bore these transferred stresses, as well as the weight of the overburden directly above them.¹⁸ Mining expert Professor Robert Ferriter described the stresses borne by barrier pillars in his September 28, 2007 testimony before the Committee:

both barrier pillars are subjected to loading and stress buildup from: 1) the adjacent longwall gob areas, 2) naturally occurring overburden above the coal seam (1,700 to 2,200 ft), and 3) loading created by the planned cave in-by the extracted pillars.¹⁹

It is these barrier pillars in Main West that Murray Energy proposed to mine in late 2006. As illustrated in the map above, all available longwall areas had already been mined – leaving the barrier pillars as the only minable coal remaining in the area. Since both barrier pillars were adjacent to large mined out longwall areas, they were subject to heightened stresses.

C. Murray Energy Has a Poor General Safety Record

MSHA statistics show that mines owned and operated by Murray Energy perform worse than the national average on safety measures. The injury incidence rate for Murray Energy owned and operated mines in 2006 was 69% higher than the national average (7.98 vs. 4.72) and, for the first quarter of 2007, 86% higher than the national average (8.15 vs. 4.37). It is worth noting, however, that before the August 6 and August 16 fatal collapses at Crandall Canyon, the injury rate for that mine was well below the national averages for both years. Taking the August events into account, however, the mine's injury rates for 2007 is far above the industry average.²⁰

With regard to seismic events of the type that occurred at Crandall Canyon, MSHA data show that, since 2000, Murray Energy owned mines have the most bumps (15) of any mine operator -- 20% of all reported bumps in MSHA's database since 2000. Clearly, higher incidence of seismic activity, by itself, does not indicate lack of attention to safety by the mine operator. Such activity could be caused by a greater proportion of "deep cover" mines which are more prone to such bumps. However, even when the list of

¹⁷ "Inby" describes activity in the direction of the working face and away from the mine entrance. "Outby" describes activity toward the mine entrance and farther from the working face.

<http://www.archcoal.com/community/miningterms.asp>

¹⁸ Technical mine experts refer to these transferred stresses as "abutment loads." See e.g. Exhibit 5.

¹⁹ October 2, 2007 Testimony of Professor Robert Ferriter, Director of Mine Safety and Health Program, Colorado School of Mines, Hearing of Senate Committee on Health, Education, Labor and Pensions, "Current Mine Safety Disasters: Issues and Challenges." ("Ferriter Testimony")

²⁰ Before the August collapses, Crandall Canyon's Fatal Injury Rate for 2006 and 2007 was zero, below the industry average for the first two quarters of 2007 of .072 and .016, respectively, and its rate for degree 2 through 4 injuries (injuries resulting in work days lost) was 2.5 and 3.47, below the industry average (first two quarters) of 4.33 and 4.16, respectively. After the August collapses, the mine's fatal injury rate for the first three quarters of 2007 was 14.14 (industry average .041 for first three quarters 2007) and its degree 2-4 injury rate was 12.57 (industry average 4.39 first three quarters 2007). (Data provided by MSHA)

seismic incidents is limited to only those occurring at “bump prone” mines, mines owned by Murray Energy have the highest total and the highest average bumps per mine of all operators of “bump prone” mines.²¹

1. Murray Energy bullied MSHA and got away with it

Evidence uncovered by the investigation indicates, albeit circumstantially, that Murray Energy sought to pressure MSHA inspectors with the ultimate purpose of lessening the rigor of safety inspections. For example, in an August 23, 2006 email, a few weeks after Murray Energy began operating Crandall Canyon, MSHA district nine manager Allyn Davis writes to a colleague that “[Murray Energy] also told my supervisor they have been very successful at getting MSHA people removed in other districts. I expected we would have trouble with this operator, but didn’t expect it on the 2nd day after they took over [the mine].” Exhibit 15. A week later, Davis writes,

Our relationship with Mr. Murray has been stormy thus far. That is also the pattern of his relationship with MSHA at his eastern mines. Just wanted to give you a heads up on that. He may not be a willing participant if he senses that anything you do could impact his ability to produce coal. Exhibit 16.

In an October 24, 2006 email, Bob Cornett, Assistant District Manager for Inspections in district nine,²² writes colleague Bill Denning (Davis’ staff assistant) about how owner Robert Murray, in a meeting with MSHA officials, emphasized his power to have MSHA inspectors transferred:

Mr. Murray also got vocal on the issue of Tim Thompson having inspectors put a closure order on his longwall and that he complained to someone in Congress about it and that Mr. Thompson resultantly lost his job. Mr. Murray did state that he did not have Thompson fired, but that he would not stand by to be treated wrongly and would complain. Exhibit 3

On October 4, 2006 assistant district 9 manager Bill Knepp writes to Kevin Stricklin, Administrator of MSHA's Office of Coal Mine Safety & Health, that

Over the course of the first 10 days of Murray Energy ownership they have aggressively opposed enforcement actions taken by [MSHA] Inspectors Durrant and Shumway, accused them both of retaliation, met with Supervisor Farmer and attempted to dictate how inspections should be performed at the mines. All indications so far are that this operator intends to use whatever means available to try to leverage enforcement at their mines. Exhibit 17

Later that year, Cornett writes Stricklin about the passive attitude towards safety at Murray Energy’s mines:

I did talk to one of our more level headed inspectors last week and he said the mines are doing less in compliance since Murray took over and that if you want something corrected or done different, you would have to cite it to get it fixed. There is no grey area with the mine management now, if you don’t issue a citation or try to suggest they do something, they will not do anything without paper. Exhibit 18.

²¹ The statistics drawn from MSHA data. “Bump prone” mines were identified by MSHA as those mines where “overburden depth exceeds 1500 feet and strong strata (e.g. sandstones) are present above and below the coal bed or previous experience has demonstrated that bumps can occur in the mine or mining region.” Exhibit 14

²² Cornett became Manager of MSHA District 3 on October 28, 2007.

Another veteran MSHA administrator writes Cornett in September 2006 that Robert Murray “has gone after several [inspectors]. Tell your people to be careful when dealing with him or any person associated with his operations...He can become abusive if he feels that it will serve his purpose. His sole intent is to discredit the inspectors that are enforcing the law.” Exhibit 19.

Indeed, the record shows that, after Murray Energy took over Crandall Canyon in August 2006, company officials *successfully* pressured MSHA to lighten up on enforcement activities. For example, on October 31, 2006, Crandall Canyon Safety Manager Jim Poulson and Corporate Director of Safety Jerry Taylor of Murray Energy subsidiary UtahAmerican met with MSHA district nine manager Allyn Davis and Assistant District Manager for Technical Programs Bob Cornett. The next day, Mr. Poulson wrote a memo to Robert Murray describing how they successfully lobbied Mr. Davis to “pull[] back on enforcement.”

...We presented to Mr. Davis and Mr. Cornett a listing of 15 orders which had been issued in the past month. It is clearly evident that the presence of Mr. Ramey, is overriding the change in enforcement standards, while acting as the field supervisor in the absence of Mr. Taylor. We discussed with Mr. Davis that the change in enforcement, without giving the operator time to comply with what was previously accepted standards was unjust and warranted relief on behalf of the operator. **Mr. Davis committed to investigating and pulling back enforcement to allow the operator time to comply.** ...We discussed with Mr. Davis and Mr. Cornett our concern about the over zealous efforts of Mr. Ramey and the impact this could have on [UtahAmerican Energy, Inc., a Murray Energy subsidiary] and the possibility of Flagrant Violations for repeated failure.

Mr. Davis again commented he would look into this issue and pull back enforcement.

[11/1/06 Memo to Bob Murray re: 10/31/06 meeting with Allyn Davis] Exhibit 4

Davis told the Committee that he assigned MSHA inspector Ramey to certain Murray Energy mines specifically because he was concerned about safety at those mines and knew Mr. Ramey would hold them to a strict standard. Davis recalled that Poulson complained to him at the October 31 meeting about Ramey’s strict enforcement of safety regulations concerning coal accumulations in roadways. Davis said that he agreed to give the company “about a week” respite from enforcement. However, Davis recalled that, after that week respite, Ramey reported to Davis that not much had changed at the mine.²³

Finally, internal documents indicate that, as of at least August 2007, the company instituted a blanket policy of contesting *all* MSHA safety citations, regardless of the merits of the contest petition. UtahAmerican Energy (“UEI”)²⁴ President Bruce Hill wrote in an August 3, 2007 report to Robert Murray:

- We are now contesting all violations issued to UEI mines, as discussed on our conference call this week. UEI had submitted payment for 6 violations written after April 22nd, but accounting had not paid the assessment and has placed the payment on hold. In addition, we have contested the violations. The assessment for the six violations ranged between \$300 and \$4,000. Except for the \$4,000 violation, all of the remaining violations were below \$500. The one large violation was a result of the section of law (75.400) having been written 29 times in the past 24 months.

²³ Committee Interview with Allyn Davis, February 14, 2008.

²⁴ UtahAmerican Energy, Inc. is a wholly owned subsidiary of Murray Energy.

Exhibit 20.

Such an institutionalized policy of battling regulators without regard to the merits of a particular citation bespeaks an inappropriate attitude towards safety.

2. Crandall Canyon had a poor safety record

MSHA inspection and enforcement statistics indicate that the Crandall Canyon mine had a spotty safety record since Murray Energy purchased it in August 2006. MSHA inspectors have issued 66 total violations to the mine since August 2006.²⁵ Of these, 22 - 33.8% -- were classified as “significant and substantial” (“S&S”), meaning that the inspector found that the violation posed a measure of danger to safety or health that was reasonably likely to result in a serious injury or illness.²⁶ From August to December 2006 (the time during which Murray Energy owned the mine), the rate of all violations that were S&S was 27%, lower than the full year 2006 national rate of 40%. However, S&S incidence at the mine went up in 2007 to 47.6%, greater than the national rate of 38%. According to MSHA data, the rate of S&S violations at Crandall Canyon per inspection hour was the same as the rate for all underground coal mines nationwide. Exhibit 21.

During the period it was under Murray Energy ownership, Crandall Canyon mine was issued several “unwarrantable failure” or 104(d) citations. In fact, it received these most serious citations at a rate much higher than the national average. MSHA’s website states that a 104(d) citation will be issued “if it is determined that the mine operator or contractor has engaged in aggravated conduct constituting more than ordinary negligence.”²⁷ During the period of Murray Energy’s ownership, MSHA records show that inspectors issued five 104(d) citations to Crandall canyon, a rate of citations per inspection hour more than three times the national average (.014 vs. .004).²⁸

Internal company documents also indicate that the safety record at Crandall Canyon Mine was worse than at other Murray Energy mines. For example, on July 20, 2007, Jerry Taylor wrote to Robert Murray stating that the incident rate for the 2nd quarter 2007 at Crandall Canyon was 10.70 – beside which Murray wrote “Awful.”

²⁵ July 5 (22 violations, 7 S&S) and December 29 (22 violations, 5 S&S), 2006 and February 1 (1 violation), May 30 (8 violations, 4 S&S), and July 5 (12 violations, 6 S&S), 2007.

²⁶ MSHA Program Policy Manual, Vol. 1 (Feb 2003, Release I-13), 104(d)(1)/(e)(1)

²⁷ The website of MSHA’s Office of Assessments

(<http://www.msha.gov/PROGRAMS/assess/citationsandorders.asp>) describes a 104(d) citation thus:

XIII. SECTION 104(d) CITATIONS AND ORDERS [104(d) Citations] ...

A 104(d)(1) citation shall be issued if:

1. there is a violation of a mandatory health or safety standard;
2. the violation significantly and substantially contributes to the cause and effect of a mine safety or health hazard; and
3. there is an **unwarrantable failure of the mine operator or contractor to comply with the standard.**

²⁸ Data in preceding two paragraphs provided by MSHA.

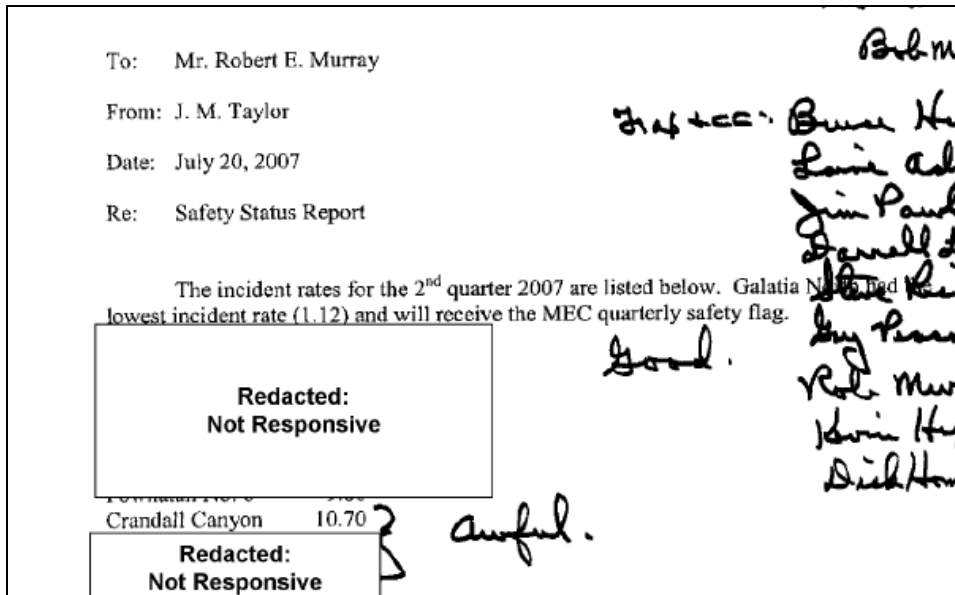


Exhibit 22

A particular MSHA inspection of Crandall Canyon bears mentioning. In the week after Christmas 2006, the MSHA field office in Price, Utah (which is responsible for Crandall Canyon mine) received an anonymous complaint of safety violations at the mine. The email below between the field office supervisor and officials at district headquarters describes the report:

During the week between Christmas 06 and New Year 07 ... An individual [called] who would not identify themselves and did not want to file a complaint but wanted MSHA to know what was going on up at the Crandall Canyon Mine. ... The Caller stated that for the men to make bonus they needed 4,000 tons by the end of the year and the belt lines were dirty, no rock dusting was being done and the section foreman Jessie Gordon was even driving a shuttle car through lunch so the tonnage could be met and **no attention was being given to safety**. Exhibit 23²⁹

The MSHA supervisor responded by immediately arranging for an inspection of the mine, which took place on December 29, 2006. His findings bore out the caller's warning that "no attention was being given to safety."

The findings of this inspection were 3 S&S ["significant and substantial"] citations, 7 Non-S&S citations, 1 104(d)(1) citation and 1 104(d)(1) order. A 110 investigation was also requested on three management officials. Exhibit 23

As the last sentence notes, MSHA inspectors found the violations so egregious that they recommended that the agency open an investigation under section 110 of the Federal Mine Safety and Health Act of 1977 (the "Mine Act") into whether Murray Energy officials at the mine had knowingly or willfully violated safety regulations.³⁰ Exhibit 24.

²⁹ MSHA Inspector Farmer told the Committee that it is improper for the section foreman to be participating in mining activities of this kind (like driving the shuttle car), since it takes him away from important safety duties.

³⁰ MSHA's Program Policy Manual states that section 110(c) of the Mine Act authorizes MSHA to "propose the assessment of a civil penalty against a director, officer, or agent of a corporate operator who knowingly orders, authorizes, or carries out a violation of a mandatory safety or health standard, or to

A violation of section 110 carries penalties of “a fine of not more than \$25,000” or “imprisonment for not more than year,” or both.³¹

MSHA attorneys advise the Committee that the investigation was closed on October 17, 2007 because three of the potential targets of the investigation were killed in the disaster or rescue attempt. “Since this left only two potential targets, both of whom were relatively low level agents, as potentially liable, the matter was closed on October 17, 2007.”³² However, only two of the targets perished in the collapses – Dale Black and Don Erickson.

Correspondence about the investigation raises doubts about whether the deaths were the only reason for closure. The electronic record of the investigation cites “lack of resources” as a reason for closure, and a letter from District 9 Manager Allyn Davis to the Assistant Director of MSHA’s Investigation Office cites “pending conference results, and the lack of resources” as reasons for closure, in addition to the deaths.³³ Davis also writes that the “case cannot be completed in a timely manner, since the 60 day investigation deadline was Feb 27, 2007.” Exhibit 26 This is incorrect. As a legal memo to DOL solicitor Clair states, “the agency was...legally in a position to continue to investigate the matter so long as the penalties could be assessed by June 28, 2008.”³⁴

MSHA’s apparent lack of diligence in investigating and pursuing the inspectors’ findings is concerning, especially considering Murray Energy’s poor safety record at Crandall Canyon. The Agency’s decision to drop the matter seems to have had nothing to do with its merits.

II. THE CRANDALL CANYON DISASTER RAISES SERIOUS QUESTIONS ABOUT EVERY LEVEL OF THE PLAN FORMULATION AND MSHA REVIEW PROCESS

This report focuses on the history of Murray Energy’s mining of the North and South barrier pillars in Main West and MSHA’s review and approval of the company’s mining plans. Even though the August 6 collapse occurred in the South barrier pillar, Murray Energy had been mining in the Main West area for almost a year. A full understanding of these prior mining activities and accompanying seismic conditions is crucial to a meaningful assessment of the factors that led to the August 6th tragedy. This section

pursue criminal proceedings against an operator or a corporate director, officer, or agent who willfully violates a mandatory safety or health standard.” MSHA Program Policy Manual, Vol. 1 (Feb 2003, Release I-13), 110(c) and (d).

³¹ Mine Act, § 110(d). Repeat violations carry stiffer penalties (up to \$50,000 and/or 5 years in prison).

³² December 21, 2007 Memo from Mark Malecki, DOL Counsel for Trial Litigation, to Edward Clair, DOL Associate Solicitor. Exhibit 25

³³ In a February 14, 2008 interview, Davis explained that MSHA investigators do not proceed with 110 cases until the conference process with the mine operator on the underlying citations is complete. Regarding the “lack of resources” comment, Davis said that district nine personnel were completely occupied with the MSHA “100% completion” initiative (<http://www.dol.gov/opa/media/press/msha/MSHA20071537.htm>) at that time, and thus his office lacked the personnel to thoroughly investigate the matter.

³⁴ Davis confirmed in a February 14, 2008 interview that the 60 day deadline to which he referred in his letter was an MSHA internal guideline, not a legally binding deadline.

recounts the history of the company's proposals to mine the barrier pillars and MSHA's review, and approval, of these proposals.

The investigation has uncovered evidence of multiple failures in the company's formulation and MSHA's review of plans to mine the barrier pillars. The plan, conceived and designed by the company and its technical consultant, Agapito Associates, posed serious safety risks that were either ignored or not detected during the planning process. The record also raises serious concerns about the rigor and completeness of MSHA's review of the company's mine plan, since MSHA's review similarly ignored or failed to detect the plan's risks.

A. The Initial Plan Should Not Have Been Proposed

1. Previous owner knew it was dangerous to do retreat mining at Crandall Canyon

CHRONOLOGY, CRANDALL CANYON PREVIOUS OWNERSHIP:

- October 27, 2004: MSHA approves Andalex's proposal to seal Main West.
- November 4, 2004: BLM Inspector Falk visit mine, reports that west mains "taking unacceptable weight...the situation in Main West is untenable for future pillar recovery."
- April 2005: Andalex submits mine plan to the Utah Division of Oil, Gas, and Mining providing that "solid coal barriers will be left [in Crandall Canyon mine] to protect main entries from mined out panels and to guarantee stability of the mine entries for the life of the mine."

The record uncovered by the investigation shows that the previous owner of Crandall Canyon decided against mining a section in an area just a few hundred feet away from where Murray Energy later conducted retreat mining, citing "adverse loading" and deteriorating conditions. However, Murray Energy pressed ahead with plans to mine the barrier pillars in spite of these concerns. While the prior owner's decision would certainly appear relevant to assessing the safety of Murray Energy's later mining plans, neither the company, Agapito nor MSHA considered this decision in formulating or reviewing the mining plan.

Prior to being purchased by Murray Energy in August 2006, Crandall Canyon Mine was owned and operated by Andalex Resources, Inc.³⁵ Andalex had conducted retreat mining in several sections of the mine, most recently in the South Mains section. (The South Mains is a large section of the mine separate from Main West.) However, at the end of 2004, the company decided not to retreat mine the main tunnels in the Main West section of the mine. Instead, it requested permission from MSHA to seal off that section.

³⁵ In early August 2006, Murray Energy Corporation purchased Andalex.

On October 27, 2004, Andalex engineer John Lewis notified BLM Inspector Stephen Falk of the company's intention to seal off Main West because "conditions were deteriorating and access through the area near impossible." Exhibit 27 In his report, Falk noted that, when he visited the Main West section "a number of years ago...[the] barrier planned on both sides [of the mains] looked like it was designed to only hold up for only a short while. The north entry was taking weight." Exhibit 27

When he visited the section again on November 4, 2004, Falk noted that

the situation is even worse...the area is taking unacceptable weight...the situation in Main West is untenable for future pillar recovery. No mining company in the area has ever pulled pillars in main entries with mined out sides and under 1500+ feet of cover...Attempts to split pillars under this depth could not hold the top and prevent pillar outbursts...Depth of cover precludes pillar recover[y] even if there were no mined out sections next door. Weight on the pillars is substantial and dangerous conditions are present. Mining any of the coal in the pillars will result in hazardous mining conditions such as pillar bursts and roof falls. Exhibit 27.

Indeed, in a followup letter to Andalex on February 23, 2005 approving the seal plan, BLM echoes Falk's conclusions, finding that "pillar recovery will not be possible:"

Genwal informed the BLM in late October, 2004, that they were planning to seal Main West due to adverse loading and the inability to maintain passage back to the end of Main West. BLM inspected the area on November 4, 2004, and noted the conditions. Heavy pillar loading was noted from crosscut 125 all the way back to near the end of Main West. Two large intersection caves were noted and heavy rib sloughage on the intake entry for most of this length. In addition, the rib line to the north barrier was pushing out coal well into the entry. It is apparent that pillar recovery will not be possible. First, before any additional mining can occur, all entries must be made travelable which will require all caves and failures clean up and secured. The depth for most of Main West is over 1500 feet with the middle area (where the worst conditions were noted) is over 2000 feet deep. Main West perform its function of

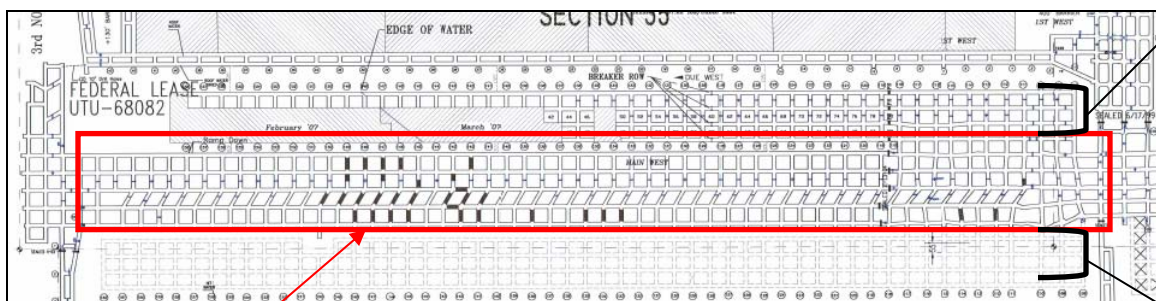
longwall gob return air courses for the life of the north and south longwall block near Joe's Valley fault but cannot be used for final pillar recovery. We agree that the pillars in Main West inby crosscut 116 cannot be recovered safely or practically. We also concur with sealing the area as the coal is not recoverable, return ventilation is no longer needed and equipment and any hazardous materials have been removed.

Exhibit 28.

Andalex also requested approval from MSHA on October 27, 2004 for the sealing of Main West. Exhibit 29.

The main tunnels that Andalex opted not to mine (also known as "Main Entries") are roads or shafts in a coal mine that serve as primary roads for haulage and the main ventilation supply. They are distinct from the barrier pillars in Main West, which separate the main tunnels from "mined out" areas.

Diagram, Main West Section



North barrier pillar

Main tunnels

South barrier pillar

With regard to the barrier pillars themselves, Andalex submitted a mining plan in April 2005 to the Utah Division of Oil, Gas, and Mining (“OGM”) providing that “solid coal barriers will be left [in Crandall Canyon mine] to protect main entries from mined out panels and to guarantee stability of the mine entries for the life of the mine” Exhibit 30. A section of the plan incorporated in 1999 also demonstrates that the company had decided not to extract the barrier pillars: “All pillars in the mine, with the exception of barrier pillars or other pillars needed to protect the outcrop, will be fully extracted.” Exhibit 31.

In sum, Andalex decided not to conduct additional mining in Main West – of either the main tunnels or the barrier pillars. The investigation has not uncovered any evidence that MSHA, in reviewing Murray Energy’s plans to mine the barrier pillars, considered Andalex’s decision to seal Main West or leave the barrier pillars in that section undisturbed. Indeed, district nine manager Allyn Davis told Committee staff he was not aware that Andalex had decided not to retreat mine the west mains.

Other correspondence between the previous owner and Utah state regulators shows that the owner felt strongly that “second mining” (another term for retreat mining) of the barrier pillars was unsafe at Crandall Canyon. A technical specialist for the State of Utah Department of Natural Resources Division of State Lands and Forestry – which oversees the company’s lease from the state of large sections of Crandall Canyon Mine – criticized the company’s proposed mining plan for not allowing retreat mining. Since State is paid royalties from sale of coal extracted from the leased property, the Department seeks to ensure maximum coal recovery. The specialist wrote that the “plan needs to explain why such wide barrier pillars may be necessary and indicate how much they may be shaved off during secondary mining.” Exhibit 32

In spite of the fact that it would profit from extracting this additional coal, company engineers strongly disagreed:

...the plan shows no second mining of barrier pillars is planned at this time. Barrier pillars are designed to protect mine workings by supporting stresses that are redistributed from the mining of section panels. Because these barriers are 'loaded up' with high concentrations of stresses it is not good mining practice to second mine barrier pillars and in fact could be dangerous. Exhibit 33.

One of the barrier pillars the company describes in the excerpt above as unsafe for mining was the South barrier pillar of Main West – where the fatal accident occurred.

It is worth noting that, in post-accident assessments of retreat mining safety at Crandall Canyon, MSHA assistant secretary Richard Stickler cited successful retreat mining in the South mains as reason to believe that retreat mining in the Main West section would go well.³⁶ However, notes taken by an Agapito employee on May 1, 2006 suggest that retreat mining in the South Mains may not have proceeded smoothly. The notes, from a meeting with Andalex engineer John Lewis, indicate that retreat mining in the South Mains involved a "roof collapse" and that section was "bouncing in places." The notes further state "S. Mains Retreat—bump, went to move to other side, roof fall." Exhibit 34.

In addition, a February 2006 internal company memo from Crandall Canyon foreman Jack Marinos to Adair and Mine Superintendent Garth Nielson reporting on mining recounted the unstable mining conditions in the South Mains and an "unplanned cave" of the roof. Marinos wrote that

we spent 10 days developing and the rest of the month pulling pillars. The conditions were significantly worse than in the past month. We had an unplanned cave that prompted us to establish a detailed procedure plan for extra support test holes, condition evaluations and positioning. Exhibit 35.

2. Agapito's Technical Analyses of Retreat Mining Safety Were Flawed

The investigation has uncovered evidence that raises serious concerns about the merits of Agapito's technical analysis of retreat mining at Crandall Canyon. In general, these findings demonstrate the need for (1) more cautious and conservative engineering assumptions to be used in safety analyses of deep cover mining, and (2) more rigorous and thorough review by regulators of technical analyses submitted by mine operators.

a) Technical Flaws

In performing geotechnical evaluations of Murray Energy's plans to mine the barrier pillars, Agapito used the computer models LAMODEL and ARMPS to calculate mine stability factors. Agapito documented its work in two reports – issued on July 20, 2006 and April 18, 2007 – and an August 9, 2006 email. The first report addressed the development of the initial four entries in the North Barrier and the second addressed

³⁶ "Just prior to Murray Energy purchasing the operation, the previous owner had retreat mined this area called the South Mains. And this is very similar. It's between two gob areas or areas that have been [longwall mined] out -- this left side with long wall mining and the right side part of it was long wall, part of it was continuous miner retreat mining -- but the previous owner had retreat mined up to about this location and Murray Energy continued. They had good results in that area." Testimony of Assistant Secretary Richard Stickler, September 5, 2007 Hearing, Subcommittee on Labor, Health and Human Services and Education of the Senate Appropriations Committee.

retreat mining in the South Barrier. The August 9, 2006 email (from Agapito to Murray Energy official Laine Adair) detailed the ARMPS and LAMODEL results for planned retreat mining in the North and South Barriers. Together, these three documents were used by Murray Energy to support its proposals to develop and retreat mine the North and South barrier pillars of Crandall Canyon's Main West section.

In a September 28, 2007 report entitled "Evaluation and Control of Coal Bumps," mining engineers at NIOSH found serious flaws in Agapito's analyses.³⁷ NIOSH's experience in this substantive area is vast. For "deep cover" mines like Crandall Canyon, NIOSH conducted a "special research project" in 1997 in which "97 panel design case histories were gathered at 29 mines located in 7 states....more than 40% of the case histories, including half of the bumps, were from coal mines in UT and CO." Exhibit 5.

ARMPS Analysis

NIOSH's primary critique of Agapito's ARMPS analysis is that it substantially overstates the strength of the remnant barrier pillars left between the newly developed entries and the gob. NIOSH engineers wrote in their report, and recently reaffirmed to the Committee in interviews, that Agapito's analysis failed to distinguish between barrier pillars – which remain between the mined-out longwall areas and the entries – and production pillars, which are pulled during retreat mining. This failure resulted in overstatement of the ability of the remnant barrier to support the load that would be transferred during Murray Energy's retreat mining.

- First, NIOSH found Agapito's modeling of the mining plan to be "very unconservative," resulting in an assessment which "substantially overstate[d]" the stability of the barrier and production pillars. ("AAI" refers to Agapito Associates, Inc.) NIOSH wrote:

Since ARMPS does not include bleeder pillars among the mining geometries it evaluates, some engineering judgment is required to consider the bleeder pillars' effect on the overall stability. In AAI's analysis, the bleeder pillars are simply added to the barrier pillar, making the total width of the barrier pillar 210 ft. This results in a very unconservative analysis, because a solid 210 ft barrier has far more load-bearing capacity than a 130 ft solid pillar plus a row of 60 by 60 ft square pillars. Two more realistic alternatives might have been to:

³⁷ All quote attributed to NIOSH in this section are drawn from the September report.

- Add the equivalent load-bearing capacity of the bleeder pillars to the barrier, which would result in an “effective barrier pillar width” of approximately 160 ft, or;
- Assume that the bleeder pillars would yield during retreat mining, so that the panel would behave as if all three rows of pillars were extracted.

The effect of modeling a solid 210 ft barrier is to substantially overstate both the BPSF and the pillar SF.

NIOSH September 28, 2007 report, Exhibit 5.

- The NIOSH authors go on to note that Agapito failed to separately calculate appropriate stability factors for barrier pillars and production pillars and that the barrier pillar stability factor (“BPSF”) in Agapito’s analysis was half of its proper value, resulting in “substantial abutment loads which likely exceed[ed]” the pillars’ “load-bearing capacity.”

In summary, the NIOSH ARMPS analyses indicate that the two remnant barrier pillars were probably the key elements in the Crandall Canyon pillar design. The BPSFs for these structures were about 1.0, significantly lower than the 2.0 guideline that was based on the deep cover case histories collected by NIOSH. A BPSF of 2.0 would have required barrier pillars that were approximately 250 ft wide. Without such substantial barriers, the pillars developed within the original barriers are subjected to substantial abutment loads, which likely exceed their load-bearing capacity.

Exhibit 5.

Incredibly, Agapito's own engineers recognized that the stability factors ("ARMPS SF" in the chart below) for the pillars they designed were below safety benchmarks established by the extensive study NIOSH had performed in 1997. In the figure below, an Agapito engineer has written on a chart which appears in a 2002 NIOSH paper on deep cover retreat mining. The line through the middle of the chart demarcates the minimum pillar stability factor below which NIOSH found that pillars had failed, typically due to a bump or bounce (the engineer describes the line as "regression line between satisfactory and unsatisfactory cases"). At the right of the chart, the engineer clearly notes that pillar stability factor of the "proposed Main West barrier retreat mining" is below NIOSH's minimum safety benchmark.

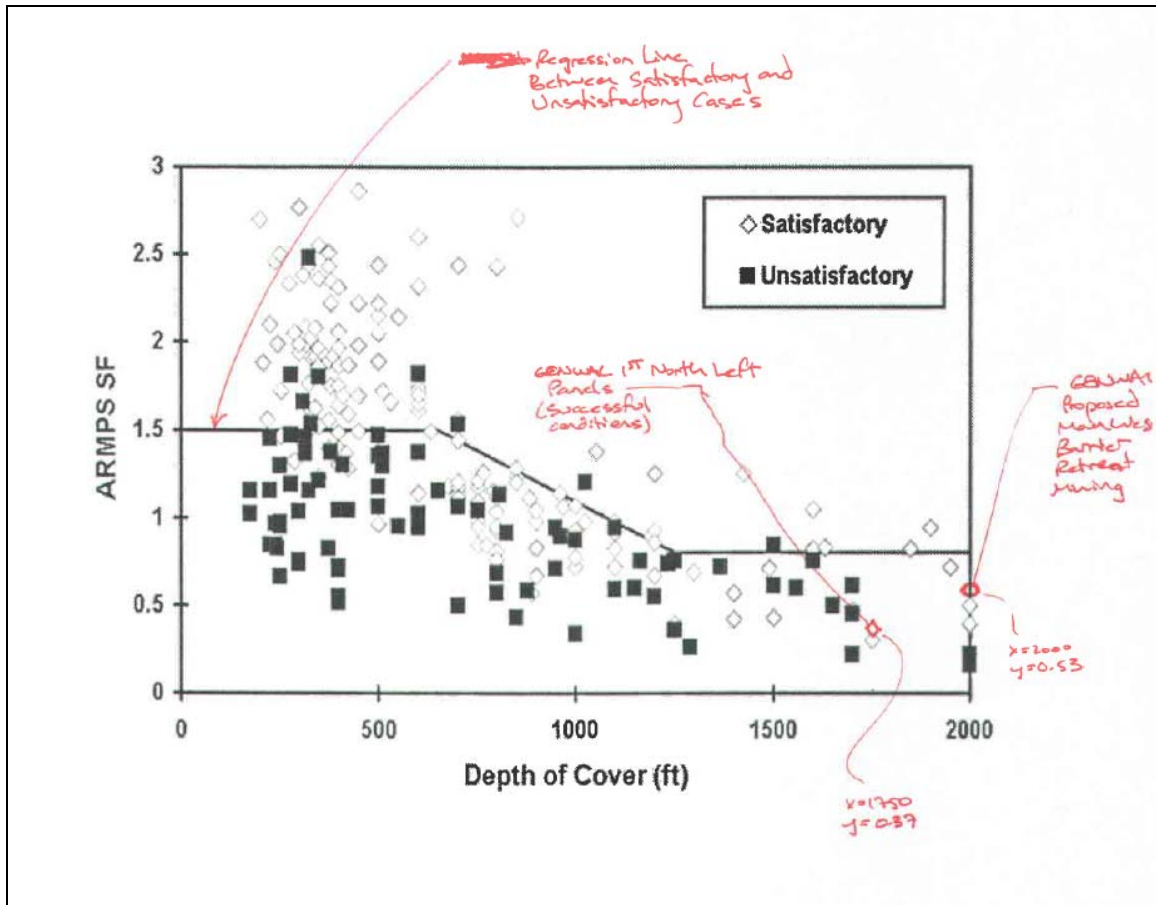


Exhibit 36.

- Also, NIOSH criticized Agapito's analysis for not allowing for the possibility that the old pillars in the main tunnels – the pillars that Andalex decided not to mine – could fail, shifting greater pressures to the pillars in the South barrier. MSHA engineer Pete Del Duca later noted this flaw in his "cursory review" of Agapito's work. Del Duca made a conservative assumption – unlike Agapito – that the pillars in the old main tunnels would fail as retreat mining occurred.

In a letter to MSHA after the accident, Agapito responded to NIOSH's critique by arguing that there is no data to indicate that such failure in the main tunnels would occur:

The existing 70 ft by 72 ft pillars in Main West have been maintained over the long term...and have required additional roof support at some locations. No significant pillar failures have been reported....Excessive convergence in the West Mains has not been reported so it was a reasonable assumption that the pillars were supporting the overburden load without significant load transfer onto the barriers due to time-dependent Main West pillar convergence. Exhibit 37.

However, as noted above, Andalex decided to seal the main tunnels in late 2004 specifically because of deteriorating conditions. Also, in a February 2005 letter

approving Andalex's proposal to seal the mains, BLM wrote that "heavy pillar loading was noted [in the mains] from crosscut 125 all the way back to near the end of Main West. Two large intersection caves were noted and heavy rib sloughage on the intake entry for most of this length." Exhibit 28. While this letter addressed the question of whether pillar recovery could be accomplished in the mains, it is important to note that instability in the mains was acknowledged as far back as 2005.

NIOSH also criticizes Agapito's model for assuming that pillars could bear unrealistically high stress levels.

The high strength of the coal elements employed in the AAI models means that very little load transfer takes place within the models. The same figure 10 cited above shows that the abutment load from the longwall gobs is almost entirely dissipated within 100 ft of the gob edge, leading AAI to conclude that "stress conditions are expected to be controlled by the depth of cover and not by the abutment loads." Within the panels, the AAI models indicate that even yielded pillars carry very high loads. For example, on page 6 of the April 18, 2007 report, a half-extracted pillar within the North Barrier is shown as almost entirely "yielded." Yet the figure on page 5 (reproduced here as figure 10) seems to show that the same remnant is carrying stresses approaching 10,000 psi!

NIOSH Report, p18. Exhibit 5.

Internal Agapito workpapers show that the Agapito engineer working on the project – Leo Gilbride – had very similar concerns. Gilbride wrote the notes below in early April 2007, when Agapito was revising Murray Energy's mining plan for the South barrier after the March bounce.

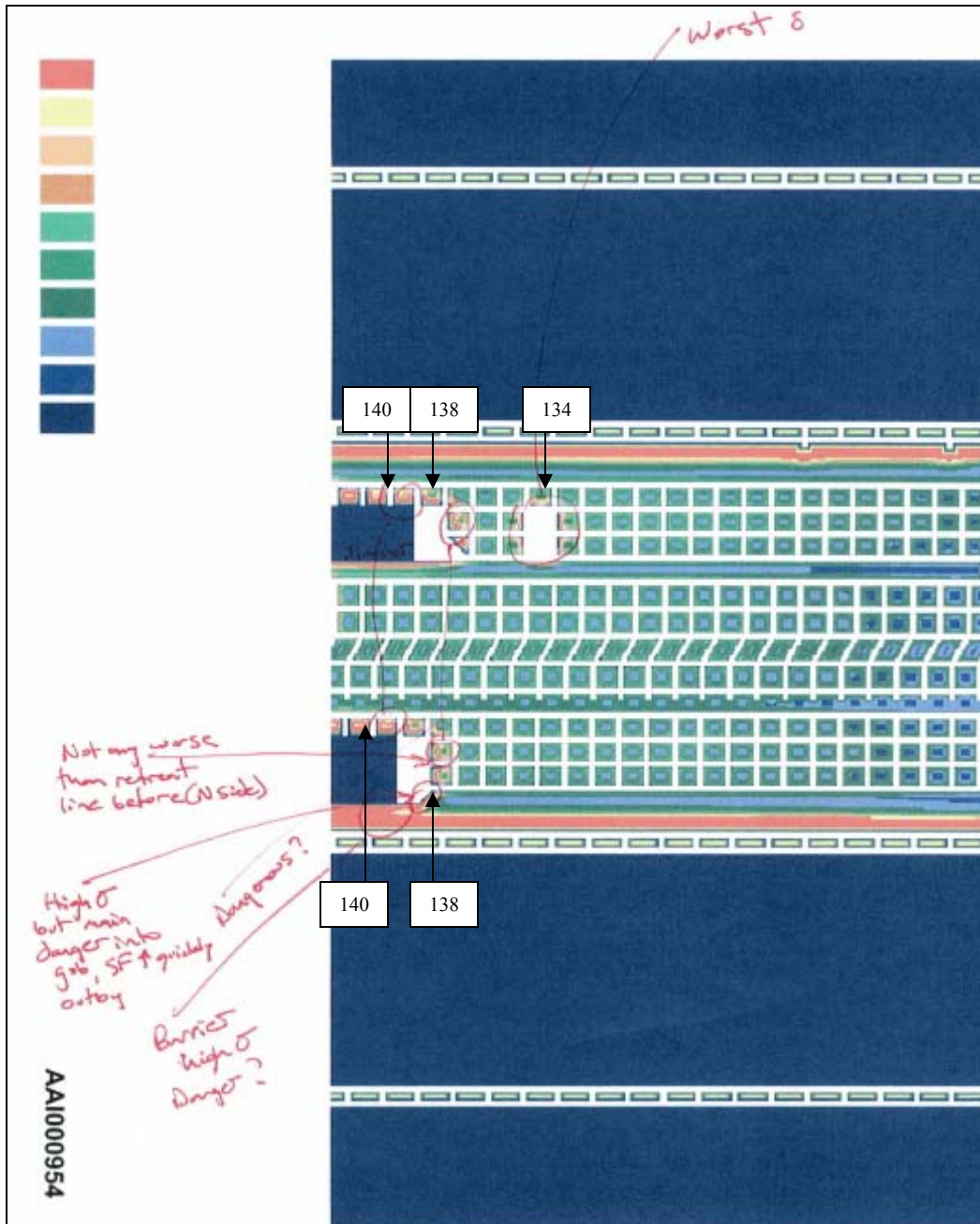


Exhibit 38.

Gilbride's notes demonstrate that the Agapito engineer in charge of the project had serious concerns about the dangers posed by Murray Energy's mining plans. At the upper right hand corner of the diagram, he has circled the area where the March bounce occurred and written "Worst [stress]." (The sigma character – σ – is used to indicate stress.) He has also drawn arrows connecting pillars in the North and South barrier to indicate that the pillars were under similar geologic conditions and stresses.³⁸

³⁸ Interview with Leo Gilbride, consultant for Agapito Associates, February 15, 2008 ("Gilbride Interview").

He particularly focuses on the stress levels on the South barrier pillars at cross cuts 139 and 138:

- In notes pointing to the middle pillar in the South barrier, he has written “Dangerous?” Exhibit 38. Gilbride told the Committee said this note meant that the area was “bounce prone.”³⁹
- With an arrow pointing to the remnant barrier pillar at crosscuts 138 and 139, he writes “High [stress] but main danger into gob, [stability factor increasing] quickly outby.” Gilbride explained this note to indicate that there were “at risk conditions” in this area of the remnant barrier. Also pointing to the remnant barrier at these crosscuts, Gilbride has written “barrier high [stress]...danger?”⁴⁰

The record shows that, at the time of the fatal August 6 bounce, the mining crew was at precisely this location, mining into the barrier pillar at or near crosscut 139.

LAMODEL Analysis

Although the September 2007 NIOSH report stated that its review of Agapito’s LAMODEL analysis was not complete at the time of publishing, NIOSH presented its preliminary results. NIOSH found Agapito’s analysis “misleading” with a “conspicuous lack of scientific, quantitative design criterion.” NIOSH further stated that Agapito’s analysis “suffered” because it did not conduct extensive in mine stress measurements or stress mapping, and thus, “there was no way to confirm whether the distribution of stresses within the model accurately reflected the true situation underground.”

NIOSH also took issue with Agapito’s use of a high coal strength quantity⁴¹ in their LAMODEL analysis, as opposed to the more conservative default coal strength quantity of 900 psi.⁴²

³⁹ Gilbride Interview.

⁴⁰ Even with the longer pillars (80 ft by 129 ft) modeled in the South barrier, Agapito’s analysis shows stress conditions identical to those that raised the concerns for Gilbride. (See Figure 5, April 18, 2007 Agapito report Exhibit 38)

⁴¹ In its September 2007 report, NIOSH describes the importance of the coal strength quantity in the LAMODEL program: “Since the pillar strength in LaModel is directly proportional to the in situ coal strength, using the 1,640 psi value greatly increases the pillars’ load bearing capacity in the model compared to the default coal strength of 900 psi.”

⁴² Pounds per square inch.

Figure 11 shows that when 1,640 psi is used for the in situ coal strength, none of the pillars in the South Barrier have yielded, and in fact they seem to be maintaining pillar strain SFs that are above 1.5. Reducing the in situ coal strength to 1,250 psi reduces the pillar strain SFs to approximately 1.0, which might be considered marginally stable. When the default value of 900 psi is used, all the pillars in the West Mains fail, and a portion of their load is transferred to the South Barrier development pillars. The calculated pillar strain SFs for the pillars in the South Barrier are all below 0.5, and are indicative of significant distress. Clearly the value selected for the in situ coal strength has a very large effect on the model results.

NIOSH Report, p.21 Exhibit 5.

In a submission to MSHA, Agapito states that the 1640 psi coal strength value was not derived from tests of actual field samples, but was extrapolated from prior successful retreat mining operations.⁴³ Agapito officials did not actually observe the areas of prior retreat mining, but rather relied upon company officials' descriptions of them.⁴⁴ In a recent letter to MSHA, Agapito further defends its use of the higher coal strength quantity by citing laboratory tests showing values as high as "4,512 psi." However, it is widely acknowledged by mining engineers and technical experts that laboratory-determined coal strength values are unreliable and often unconservative. NIOSH engineers also note that extrapolating coal strength from only one retreat mining area does not provide a sufficiently large data sample from which to extrapolate confidently.

NIOSH concludes that the risks of Murray Energy's retreat mining plan were much greater than Agapito's analysis indicated:

[t]he NIOSH analysis using the ARMPS program indicates that an elevated risk of bumps was present in the Crandall Canyon West Mains area, due to the deep cover and the low barrier pillar stability factors of the remnant barrier pillars.

⁴³ In a December 3, 2007 submission to MSHA, Agapito explained that the "coal strength was calibrated from three mining stages in the south panel of Section 36. The coal strength was incrementally increased from 900 psi to 1640 psi until modeling results were consistent with actual conditions. The average cover depth in this calibration panel was about 1,700 ft. **We were told that all the pillars during retreat mining were stable and only limited yielding occurred at some pillar ribs.**" (emphasis added) Exhibit 39.

⁴⁴ Interview with Agapito Associates, Inc. Principal Michael Hardy, January 17, 2008.

b) Flawed Mine Map Used By Agapito

Evidence uncovered by the investigation indicates that Agapito relied on flawed data in its analyses. Specifically, post accident analysis by MSHA experts indicates that Agapito used incorrect mine depth data, leading them to miscalculate the overburden over the retreat mining areas. Precise calculation of overburden is critical to accurately assess risk of pillar extraction, since pressure on pillars intensifies as overburden increases. In an email after the August collapses, an MSHA expert describes the mapping error:

Of interest, having the Mapinfo map not only showed Mike that they were just coming to the deepest overburden, rather than already through it like they thought, but Agapito also did their modeling based on the incorrect topography that the mine had. It was apparent by looking at the Mapinfo map that their overburden was wrong, so the margin of safety that they may have thought they had didn't exist. Their model was based on 1,800 feet of overburden at a different area, when in fact it was only 1,600 feet of overburden.

....The Mains were already showing stress when the longwalls on either side went by, so the stress had already jumped the wide barriers, and then they mined out those barriers and pulled pillars, so conditions were only getting worse. There's just nothing left to support that roof, except the few remaining pillars that have bumped. The stress zone has shifted almost to the outby section neck, so the whole room-and-pillared barrier is failing. Exhibit 40

B. The Initial Plan Should Not Have Been Approved

The record shows that MSHA's review of the company's mine plan was often rushed, superficial, and pro forma. Indeed, mining expert and former MSHA engineer Robert Ferriter described MSHA's review of Crandall Canyon's mine plan as a "broken system."⁴⁵

The MSHA Review Process

Federal law – specifically, the Mine Act – requires MSHA regulators to review and approve all plans for underground coal mining. Among other things, the law requires the mine operator to submit a roof control plan describing how the operator will ensure the stability of the section to be mined. At the outset of mining, mine operators typically file a detailed "master" roof plan document setting out all proposed areas to be mined and techniques to be employed. If the operator decides to conduct any activity not addressed by the "master" plan, the operator must file a proposed plan amendment with MSHA, which must approve each amendment before the proposed mining activity begins. [30 CFR 75.220, Mine Act section 302.]

⁴⁵ Ferriter Testimony.

CHRONOLOGY: MINING NORTH BARRIER PILLAR

- Spring 2006: Andalex officials first meet with MSHA about mining North and South barrier pillars.
- August 6, 2006: Murray Energy takes ownership of Crandall Canyon Mine
- September 8, 2006: MSHA officials meet with Murray Energy about mining the barrier pillars
- November 13, 2006: Murray Energy submits proposal for development mining in North barrier pillar
- November 21, 2006: MSHA approves proposal for development mining in North Barrier pillar, sends analysis to Murray Energy showing retreat mining unsafe on the scope proposed by company. Murray Energy begins mining the barrier pillar immediately.
- December 20, 2006: Murray Energy submits proposal for retreat mining in North Barrier pillar.
- January 9, 2007: Owens and Del Duca visit mine to observe conditions in North barrier during development.
- February 2, 2007: MSHA approves retreat mining in North barrier pillar.
- February 16, 2007: Murray Energy begins retreat mining in North barrier.
- February 20, 2007: Murray Energy submits proposal to development mine in South barrier pillar.
- February 27, 2007: BLM Inspector Falk visits the mine and reports he is concerned with pillar extraction plan.
- March 8, 2007: MSHA approves development mining proposal for South barrier.
- March 11, 2007: **Major bounce in North barrier during retreat mining.** Company ceased mining operations in the North barrier

The law requires that the MSHA district office manager sign off on all roof control plans and plan amendments for mines in the district. Typically, each MSHA district office, and the field offices within that district, has a department dedicated to reviewing roof control plans. Crandall Canyon mine is located in MSHA district 9, headed by district manager Allyn Davis,⁴⁶ and is inspected by personnel in the district's Price, Utah field office. Roof control department supervisor Billy Owens and his staff are responsible for reviewing roof control plans and amendments. Owens told the Committee that he first reviews roof control plan amendments and generates an approval or disapproval letter, which is forwarded for review to assistant district manager Bill Knepp. Knepp reviews Owens' work, makes a recommendation, and forwards it to district manager Allyn Davis for final approval or disapproval. If questions arise at any point during this process, Knepp and Davis contact Owens for factual or technical clarification.⁴⁷

⁴⁶ District 9 encompasses all mines west of the Mississippi River.

⁴⁷ Owens Interview.

In late 2006 and early 2007, the company filed a series of amendments to the existing roof control and ventilation plans proposing that it mine the North and South barrier pillars in Main West using the room and pillar technique. As proposed, a continuous mining machine would drive three entries into the barriers to the back of the mains (which ended at a geologic fault) – known as the “development” phase. After reaching the fault, the crews would then retreat mine the barriers, extracting the pillars they had created in development – the “retreat” phase.

Andalex first approached MSHA with proposals for mining the barrier pillars sometime in the spring of 2006. On September 8, 2006, Adair again met with Owens and District 9 Manager Allyn Davis and “proposed pillar mining in barriers of Main West. [Adair] left consultant reports to be reviewed by district to support his position.” K1-6 85. These reports were written by engineering consultant Agapito Associates. According to Owens, Murray Energy sought approval for both development and retreat mining in the North and South Barrier Pillars at that time.⁴⁸

After this meeting, Owens asked Pete Del Duca, an engineer working for MSHA district 9, to test Agapito’s analyses by conducting a “cursory review” of their work.⁴⁹ At this point, Murray Energy had not made any official submissions for mining in the barrier pillars.

1. MSHA disregarded initial recommendation against approval (Del Duca analysis)

There are several crucial moments in the history of MSHA’s review and approval of Murray Energy’s plans to mine the barrier pillars at Crandall Canyon – Del Duca’s review of Agapito’s analyses, and MSHA’s reaction to his review, is one. Del Duca’s analysis raised red flags about the rigor of Agapito’s work, and the safety of retreat mining in the barrier pillars, that MSHA management effectively ignored.

Disengagement of MSHA Supervisors

Before examining the details of the MSHA review process, it is important to note that the record shows that Owens’ supervisors – assistant district manager Bill Knepp and district manager Allyn Davis – were both disengaged from the process of evaluating, discussing and reviewing Murray Energy’s plans to mine the pillars. For example, Davis told the Committee he was unaware that engineer Pete Del Duca had run an analysis of the company’s mining plans in September of 2006 that raised serious questions about retreat mining in the barrier pillars. In spite of the fact that Murray Energy was preparing to embark on one of the most dangerous mining operations ever attempted, Davis said he did not have regular meetings with Owens about safety conditions at Crandall Canyon, nor did he regularly talk to Crandall Canyon officials about mining conditions.⁵⁰

⁴⁸ Committee Interview with Billy Owens, September 26, 2007. (“Owens Interview”)

⁴⁹ Committee Interview with Pete Del Duca, November 20, 2007. (“Del Duca Interview”)

⁵⁰ Committee Interview with Allyn Davis, February 14, 2007.

Similarly, Knepp said that he relied heavily on Owens in reviewing and evaluating the details of Murray Energy's mine plans. Knepp did not meet with Agapito or Murray Energy about the details of the proposed mine plans, and he did not personally discuss mining conditions as development and retreat mining proceeded, relying instead on updates from Owens. Knepp said he was never made aware of the severity of the March bounce.⁵¹

a) Del Duca's Analysis

Using a certified map of the mine, Del Duca reran ARMPS to test Agapito's work.⁵² His calculations showed that, for the North Barrier Pillar, "development could be completed under favorable conditions and retreat could be expected to be favorable for 1300 feet," while for the South Barrier Pillar, "it was determined that development could be completed with favorable stability, but extraction should only be expected as stable for 900 feet." In short, Del Duca's independent analysis found that complete pillar extraction of both Barrier Pillars, as the company proposed, was unsafe.⁵³ As a result, Del Duca recommended that Murray Energy's retreat mining plan ("pillaring" plan) be rejected.

Del Duca's analysis was prescient – his report found that retreat mining could be safely conducted only from crosscuts 163 to 149 in the North barrier and from crosscuts 149 to 142 in the South barrier.⁵⁴ In March, the North barrier collapsed during retreat mining at crosscut 133, and, in August's deadly tragedy, the South barrier collapsed at crosscut 139, both beyond the points Del Duca predicted would be safe.

Del Duca completed his review at the end of September or beginning of October and submitted it to Owens, who signed off.⁵⁵ On November 21, 2006, Allyn Davis sent the results of the analysis to mine manager Gary Peacock setting out Del Duca's findings. Exhibit 42. In the letter, Davis wrote that "A preliminary analysis for projected pillaring of the Main West section was submitted to this office for a cursory review. The plan, as is currently written, would not be approved." Exhibit 42.

⁵¹ Committee interview with Bill Knepp, February 26, 2008.

⁵² ARMPS was created by engineers at the National Institute for Occupational Safety and Health ("NIOSH"), a division of the Centers for Disease Control and Prevention. In a recent report, NIOSH describes ARMPS as a computer program "widely used throughout the U.S." that is designed to "help mine planners design coal pillars" where room and pillar and retreat mining techniques are used. ARMPS is considered an empirical model, because it is "based on case histories or full-scale pillar performance in coal mines... empirical models do not require a full understanding of the mechanics of pillar behavior."

⁵³ Del Duca's complete analysis, including his description of sources of data and methodology, is attached as Exhibit 41. Del Duca did not rerun the other computer model used by Agapito, called LAMODEL, but checked the numerical inputs Agapito used.

⁵⁴ These crosscut numbers reference crosscuts as plotted in the mine map included in the MSHA-approved mining plans for the North and South barriers.

⁵⁵ Email from Peter Del Duca February 19, 2008.

b) Agapito's Objections to Del Duca's Method; Del Duca's Analysis Discarded

After sending this letter, in December Owens spoke with Murray Energy Official Laine Adair about Del Duca's findings. After this conversation, Owens told Del Duca that his analysis was flawed in several respects. Exhibit 41. Specifically, Owens told Del Duca that (1) the proper coal strength for Crandall Canyon was higher – 1640 psi—than the value – 900 psi – that Del Duca used,⁵⁶ (2) that Agapito's analysis of previous retreat mining panels indicated that the barrier pillar stability factor should be higher, (3) and Del Duca used a unduly conservative mining geometry (assuming that eight pillars would be removed, rather than three, as Agapito assumed).⁵⁷

Evidence gathered by the investigation shows that Owens did not ask Del Duca to re-run the software models after his conversation with Murray Energy, nor did any MSHA official perform additional analysis of the Agapito models. Indeed, Owens seems to have simply accepted the company's rebuttal of Del Duca's analysis at face value. In a second interview with the Committee, Owens said he vaguely recalled that he and Del Duca reran ARMPS after his conversation with Adair to confirm the company's findings, but he couldn't specifically remember.⁵⁸ In his first interview with the Committee, Owens made no mention of rerunning the model. Del Duca specifically told the Committee that he did *not* rerun the model after Owens' conversation with the company. The comprehensive documentary record provided by MSHA contains no evidence – like a computer output – that this rerun of ARMPS ever occurred. Given Del Duca's findings, MSHA should have at least run the model again, taking Agapito's comments into account.

2. MSHA failed to rigorously review flawed Murray-provided engineering analysis

a) Approval of Development; Monitoring and Notification Requirements

On the same day that Owens sent Murray Energy Del Duca's critique of Agapito's work (November 21, 2006), MSHA approved a roof control plan amendment for performing only development mining in the North Barrier, and Murray Energy began mining the same day. Exhibit 43. Owens told Committee staff that, after the September 8 meeting with Murray Energy, he decided not to approve the company's "omnibus" request for development and retreat mining in the barriers, but required the company to submit each stage for separate approval so that MSHA could periodically assess mine stability before allowing mining to proceed.

Of critical importance is the fact that Owens required the company to keep him closely apprised of all developments in mining conditions in the North (and later the South) barriers – a more stringent requirement than federal law.⁵⁹ In a February 23, 2007 email

⁵⁶ Del Duca used the ARMPS program's "default" value for coal strength – 900 psi.

⁵⁷ Del Duca Interview.

⁵⁸ Committee Interview of Billy Owens, February 22, 2008.

⁵⁹ Owens Interview.

from Adair to Bruce Hill, Adair notes that he is “obligated to keep Billy Owens [of] MSHA Denver [office] up dated” about mining conditions. Exhibit 44.

b) Retreat Mining Proposal and Review; MSHA January 9 Site Visit

Murray Energy officially submitted its proposal to retreat mine the North Barrier Pillar on December 20, 2006. Other than Del Duca’s analysis (discarded by Owens), the only review MSHA performed on the company’s North Barrier retreat mining plan was a site visit on January 9, 2007 to observe the progress of development mining. Owens told the Committee that, during the visit, he assessed the condition of the pillars and told the company it should leave top coal in that section during development to reinforce the roof.⁶⁰ During the visit, Owens saw a large amount of coal slough off of a pillar, but he said the material yielded in a controlled manner and did not obstruct the transportation routes within the mine.⁶¹

After the visit, Owens required that the company make one change to its proposed retreat mining plan – to add support to the bleeder entry.⁶² According to Owens, it took the company a couple of attempts to satisfy this requirement.

In his interview with Committee staff, Owens cited an Agapito report of their December 1, 2006 site visit as evidence supporting approval of the retreat mining plan. Agapito’s report noted

good to excellent ground conditions were observed at all locations visited. Stable roof, floor and ribs with only minor rib sloughage were observed in the recently mined areas in the West Main barrier. Exhibit 46.

Owens also told Committee staff that, in reviewing the company’s retreat mining proposals, he thought it relevant that injury rates for Crandall Canyon were well below the national average. Owens felt that this record indicated that Murray Energy was adept at retreat mining. While incident rates at Crandall Canyon through February 2007 were lower than the national average, Owens had ample evidence of safety problems at the mine. As discussed above, MSHA inspectors had conducted a surprise inspection at the mine at the very end of 2006 on reports that “no attention was being given to safety” and had found several serious safety infractions, issuing 3 S&S, 7 other citations, and opening an investigation into whether management knowingly or willfully violated safety standards.

In addition, the record shows that Murray Energy officials put pressure on District 9 Manager Allyn Davis to approve the retreat mining plan in the North barrier quickly. In

⁶⁰ “Top coal” refers to coal left on the roof to strengthen roof support. Del Duca confirmed this recommendation in his interview. A post-accident MSHA chronology of the roof control process states that, “[d]ue to problems with the immediate roof raveling onto the continuous miner prior to being bolted, it was determined that the mine should leave top coal to help control this.” Murray Energy submitted a revised roof control plan incorporating Owens’ suggestions on January 10, 2007, and it was approved on the 18th. Exhibit 45.

⁶¹ Owens Interview.

⁶² The “bleeder entry” is the tunnel farthest from the active mining face that serves as the return for stale air.

a memo to CEO Robert Murray summarizing a February 1, 2007 meeting with Davis, UEI President Bruce Hill writes:

Mr. Murray,

Al Davis and I just completed a two hour one-on-one meeting at his Denver office. The highlights of the meeting are as follows:

...

3. On particular issues, we discussed the need for approval of the pillaring plan at Crandall within the next twenty days. He said he would help expedite the process.

Exhibit 47.

Hill's record of the meeting also raises concerns that the company's effort to rush through the retreat mining plan was bolstered by an exchange of favors between MSHA and Murray Energy. The very next item in Hill's memo reflects that Davis asked Hill for a favor:

4. Davis asked for help in regard to Stickler and our input about the inspection activity in the west versus the east. Specifically, he discussed a meeting he had with Stickler two days ago regarding western ventilation. The purpose of the meeting was to inform Stickler of the particular issues confronting western mines and the need to manage them differently than eastern operations. He thinks our input to Stickler, backing his thoughts, would help western operations.

Exhibit 47.

MSHA eventually approved the retreat mining plan the next day – February 2, 2007. Exhibit 48. An email from Hill to Peacock on the third shows that Hill thought his meeting with Davis sped the approval:

From: Hill, Bruce [bhill@coalsource.com]
Sent: Saturday, February 03, 2007 4:07 PM
To: gpeacock@utahamerican.com
Cc: Laine Adair; Hibbs, David
Subject: FW: Crandall Production i.e.2-02-07
Attachments: Crandall Production i.e.2-02-07.tif

Gary,

Looking better. Amazing what impact a little top can have on production!! Keep it up. By the way, talked to Davis two days ago regarding your pillar plan and we received approval yesterday.

Exhibit 49

When interviewed by the Committee about this meeting, Davis said that mine operators ask him to expedite plan amendments all the time, and he only responds to the request if the operator can't proceed with mining otherwise. Davis acknowledged that he asked Hill to speak to Secretary Stickler about a ventilation issue he had long been concerned about in Western mines, and that he thought an operator's perspective would be helpful

in communicating the issue. Davis said if he advocated it to the Assistant Secretary, it would appear that he was taking a pro-company stance.⁶³

C. The Plan Should Not Have Been Pursued As Conditions Worsened

Even setting aside problems with Murray Energy's formulation and MSHA's review of the mining plans, there were multiple warning signs during mining operations – including heightened seismic activity and a major mine bounce – that should have raised red flags for both MSHA and the mine operator. The company ignored these signs of danger and did not tell MSHA about them, as the company promised it would do.⁶⁴

BLM inspector Stephen Falk expressed serious reservations about the company's plan to mine the Barrier Pillars in a series of reports in 2006 and 2007. Reporting on a December 14, 2006 visit to the mine, Falk wrote that he "warned [the company] to beware of the depth above the ridge and mining a barrier pillar that has been sitting for a number of years. Pulling pillars will be interesting if even MSHA will ok a ventilation and roof control plan for the section." Exhibit 8.

Reporting on a February 27, 2007 inspection, BLM Inspector Falk described the progress of retreat mining in the North Barrier:

stopped advance at this point and began pulling pillars back. They got a special pillar plan approved by MSHA to pull the south two of three pillars and have the return out the north most entry. So far, the crews have pulled 18 pillars or 9 rows. Currently they are pulling the pillars between crosscut 149 and 150. I have been concerned about pulling pillars in this environment with mining a narrow block with little coal barriers to mined out blocks on both sides. Fortunately, the beginning depth on the west end toward the Joe's Valley Fault is somewhat shallow starting at 1300 feet. So far no inordinate pillar stresses have been noted, though thing should get interesting soon. The face is under 1600 feet of cover

Exhibit 50

BLM representatives told the Committee that MSHA and BLM do not regularly share information about mine conditions. While BLM's statutory mandate is to maximize coal recovery on federal lands to derive revenue from leases,⁶⁵ nothing prohibits BLM and MSHA from sharing information about mine safety. Clearly, had they done so in this instance, things might have turned out very differently.

⁶³ Davis interview, February 14, 2008.

⁶⁴ Committee Interview with Billy Owens, February 20, 2008. Owens' handwritten notes of conversations with Murray Energy show that the company did not inform him about most of the signs of instability listed below. The record shows that the company apprised Owens only of problems with roof coal in the North barrier during development and of the March bounce.

⁶⁵ 43 CFR 1601.0-2 describes BLM's goal in administering natural resources on federal lands: "The objective of resource management planning by the Bureau of Land Management is to maximize resource values for the public through a rational, consistently applied set of regulations and procedures which promote the concept of multiple use management and ensure participation by the public, state and local governments, Indian tribes and appropriate Federal agencies." The regulations also require mine operators mining in federal lands to submit a plan to achieve "maximum economic recovery...of the Federal coal." 43 CFR 3484.1.

1. Murray had evidence of deteriorating conditions in the North barrier

The record shows multiple warnings signs during Murray Energy's development and retreat mining of the North barrier that were ignored by the company and not reported to MSHA.

a) North Barrier Development Mining

The investigation has uncovered evidence showing that conditions in the North Barrier during development mining were not stable and that the coal pillars were under significant strain—conditions which worsened whenever the mining crew approached the area under the deepest cover.

- Several internal company safety reports show that the ribs (which serve as “walls” and support the roof) were shedding coal and falling out – sure signs of excessive stress or “loading.” These reports also noted that the spacing of roof bolts was dangerously wide – also a sign of increasing pressure on coal pillars and ribs.⁶⁶
 - As early as December 2006, Gary Peacock reported to mine manager Adair that the “conditions have become a little more challenging” in the North Barrier. Peacock said the “ribs are seeing quite a bit of sloughage, causing some problems keeping the outside bolt close enough to the rib to stay in compliance.” Exhibit 51.
 - 1/1/07: CC Main West production report Exhibit 52. “Cleaning up rock (**roof fall**) in x cut.”
 - 1/9/07: “Bolt spacing caused by rib sloughage.” Exhibit 53.
 - 1/10/07: “Top condition: **poor**” Exhibit 54.
 - 1/16/07: “Bolt spacing, rib sloughage caused.” Exhibit 55.
 - 1/21/07: “Rib fell away,” “Bolt spacing too far.” Exhibit 56.
 - 1/24/07: “Top condition: **poor.**” Exhibit 57.
- Another Peacock report at the end of January states “the top conditions deteriorated to the point that we had to shorten our cuts to keep the immediate top up.” Exhibit 58.
- A February 6 internal company report notes “12 major areas of questionable roof and rib conditions” and raises concerns about whether the company was properly recording conditions in the “preshift book,” the mine safety record monitored by MSHA:

		We have 12 major areas of questionable roof and rib conditions we need to get people on this As soon as possible, also we need to start putting some of these areas in the general pre shift book.
--	--	---

Exhibit 59.

⁶⁶ MSHA Inspector Donnie Durrant interview, October 10.

- A February 7 internal report describes “unpredictable rolling out rib conditions...in Main West.” Exhibit 60.
- After the August accident, Laine Adair told MSHA investigator Michael Gauna that “when the north development went under the deeper cover [of] 2000’ +, **bumping and thumping noises** were very evident and frequent. It stopped after the faces had passed on the west side of the overlying ridge.” Exhibit 61. (emphasis added)

Owens told the Committee that, after his January 9 visit, Adair called “routinely” to advise him about conditions. According to Owens, Adair said that roof rock had solved some of the roof problems they had encountered earlier in North Barrier development, and that conditions were good.⁶⁷ However, the record above demonstrates that there were significant stability problems in the area. There is no evidence in the record that Adair or any other Murray Energy official notified MSHA of these problems.

b) North Barrier Retreat Mining

Internal company documents show that the company began retreat mining in the North barrier on February 16. Exhibit 62. Ten days after retreat mining began, mine manager Gary Peacock reported in an internal meeting that “Conditions are still very good....Have pulled ten rows (at crosscut 148).” Exhibit 63.

However, just as during development mining, when the crew approached the area under the deepest overburden, conditions rapidly worsened. Indeed, Peacock predicts worsening conditions in a February month end update to Adair: “The amount of cover is rapidly increasing going into March and I do not anticipate the same conditions we experienced in February.” Exhibit 64. Internal documents show that the crew began to retreat under the deepest cover in the last week of February and the first week of March. Exhibit 44.

By March 7, the tone of Peacock’s reports changed markedly: “conditions are more challenging as [mining crews] are under 2,000 feet of cover.” Exhibit 65. The chart below documents several roof falls, caves and bounces that occurred in the North barrier during retreat mining, prior to the March 11 bounce.

⁶⁷ Owens Interview

Date	Report Name	Reported Event
02/21/07	Main West Mining report Exhibit 66.	“Repairing stoppings after cave .” (reported on preshift main west report, Exhibit 67.
02/22/07	Shift Foreman’s Report Exhibit 68.	“Getting some hard bounces, still caving right on our ass”
02/27/07	Shift Foreman’s Report Exhibit 69.	“Good bounces”
03/01/07	Main West Mining report, Shift Foreman’s Report Exhibit 70, Exhibit 71	“ Cave blown out two stopping move MRS to south side at section.” “Had top rock fall on Miner in #24 pillar got us stuck.”
03/02/07	Main West Mining report Exhibit 72.	“ Top got bad . Had to shutdown, set timber”
03/02/07	Main West Mining report Exhibit 73.	“Top Condition: Bad .”
03/05/07	Shift Foreman’s Report Exhibit 74.	“ Hard bounces that knocked top coal loose”
03/06/07	Main West Mining report Exhibit 75.	“ Roof Fall ”
03/07/07	Crandall Mine Shift Foreman’s Reports Exhibit 7.	“... Bouncing real hard on occasion . Smacked little Carlos up aside of the haid [sic] with a pretty good chunk.”
03/07/07	Crandall Mine Shift Foreman’s Reports Exhibit 7.	“... Real hard bounce , blowed [sic] ribs down in 2-3 x-cut and Beltline, down for a while with #7-MRS, wires got knocked loose inside Controller, shut down at 1:00pm to move section power done about 3:00pm . #7 MRS wouldn’t hold power, got mining again about 3:30....”
03/07/07	Staff Meeting Minutes Exhibit 76	“ There was a bounce last night that hit Carlos Payon in the cheek with a lump of coal , but it was not serious enough for him to need medical attention.”
03/08/07	Crandall Mine Shift Foreman’s Reports Exhibit 77.	“... Bouncing pretty hard in the # 40 pillar. Drug belt down to winder....”
03/09/07	Crandall Main West Mining Report Exhibit 78.	“Rib blow out and hit breaker on miner. Had to set timber in to reset it...cave on miner.”
03/10/07	Crandall Mine Shift Foreman’s Reports Exhibit 79.	“Had bad bounce filled entry with coal had to clean—scoop was covered so much had to pull out—roadways had to be cleaned...”
03/10/07	Crandall Mine Shift Foreman’s Reports Exhibit 77.	"... Bouncing pretty hard in the # 40 pillar.”
03/10/07	Crandall Mine Shift Foreman’s Reports Exhibit 80.	“...still bouncing pretty hard .”
03/10/07	Main West Mining report Exhibit 81.	“Clean Entries with miner and repair damaged stoppings”

Finally, a March 10, 2007 internal memo conclusively establishes that the company had ample warning of instability in the North barrier pillar and that management, including CEO Robert Murray, was aware of it. The memo to Mr. Murray noted the worsening mining conditions and increased instability in the area, stating that “The mine is experiencing heavy bouncing and rib sloughage.” Beside this description, Mr. Murray wrote “noted. Bounce ended it.”

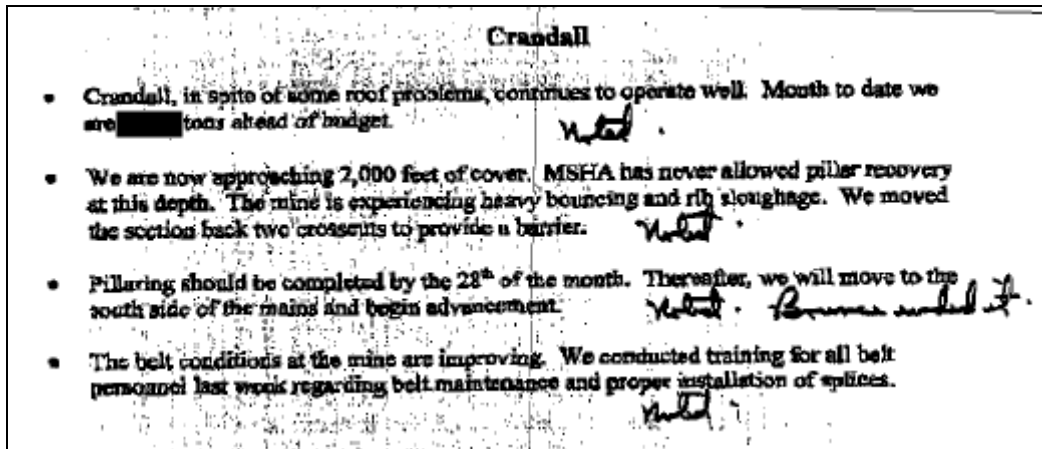


Exhibit 2.

It is important to note that the record shows periods of stability and good mining conditions in the North Barrier during development and retreat. For example, Adair reports to Hill on February 23 that the “ground conditions in the Crandall pillar section are very good. They have retreated 6 rows of pillars and are now under about 1,600 [feet] of cover.” Exhibit 82. However, it is clear that stable conditions persisted only while the mining crew was under shallow cover – conditions rapidly worsened as they approached deeper cover, just as Del Duca had predicted.

Other than the first of the events (on February 21, 2007) listed in the chart above, none of these signs of instability— increasing in intensity – were reported in the logs that the company is required to maintain by law.⁶⁸ MSHA inspectors consult these logs to

⁶⁸ **30 CFR § 75.360 Preshift examination.**

(a)(1) Except as provided in paragraph (a)(2) of this section, a certified person designated by the operator must make a preshift examination within 3 hours preceding the beginning of any 8-hour interval during which any person is scheduled to work or travel underground.

... (b) The person conducting the preshift examination shall examine for hazardous conditions.

... (f) *Recordkeeping.* A record of the results of each preshift examination, including a **record of hazardous conditions and their locations** found by the examiner during each examination and of the results and locations of air and methane measurements, shall be made on the surface before any persons, other than certified persons conducting examinations required by this subpart, enter any underground area of the mine.

30 CFR § 75.362 On-shift examination.

determine mining conditions since the last inspection, so it is essential that these logs be complete and accurate for MSHA to monitor safety conditions. Indeed, a January 2, 2007 internal Murray Energy “Inspector Comment Sheet” sternly reprimands mine personnel for failing to maintain these books: “Inconsistent DTI on the book at #6 tail this is defiantly grounds for an[] inadequate pre-shift.” Exhibit 83. Again, there is no evidence that Adair or any other Murray Energy official contacted MSHA about these problems.

c) The March Bounce

By early March, roof conditions began to worsen in the northern barrier prompting Murray Energy to stop pulling pillars between crosscuts 135 and 138 and resume at crosscut 134. The April 18th Agapito report attributed this decision to skip pillars to “poor roof conditions” thus “motiv[at]ing moving the face outby and skipping pulling pillars...” Exhibit 84. Murray Energy re-initiated mining by pulling the two pillars between crosscuts 134 and 135. However, when pillars were pulled at crosscut 133, Crandall Canyon Mine experienced a large bounce so powerful that it damaged nearly 800 feet of the Crandall Canyon mine -- leading Murray Energy to abandon its plans to develop the remaining northern panel and seal the area.

When the March bounce occurred, Murray Energy averted disaster only by chance, since the bounce occurred in the middle of the night, when no miners were close to the mining face. A mining engineer who worked for Murray Energy told the Committee that miners would have been injured had the bounce occurred during active mining.⁶⁹ The multiple warning signs that preceded the March bounce and the force of the collapse itself should have alerted MSHA and the company to fundamental flaws in the barrier pillar retreat mining plans. MSHA and Murray Energy knew that the depth of cover and other geological characteristics of the South barrier pillar were extremely similar to the North, yet they allowed retreat mining to go forward in the South.

Several internal Murray Energy documents make clear that the bounce was powerful and made further mining impossible:

(a)(1) At least once during each shift, or more often if necessary for safety, a certified person designated by the operator shall conduct an on-shift examination of each section where anyone is assigned to work during the shift and any area where mechanized mining equipment is being installed or removed during the shift. **The certified person shall check for hazardous conditions**, test for methane and oxygen deficiency, and determine if the air is moving in its proper direction.

30 CFR § 75.363: Hazardous Conditions; posting, correcting, and recording

...

(b) A record shall be made of any hazardous condition found. This record shall be kept in a book maintained for this purpose on the surface at the mine. The record shall be made by the completion of the shift on which the hazardous condition is found and shall include the nature and location of the hazardous condition and the corrective action taken. This record shall not be required for shifts when no hazardous conditions are found or for hazardous conditions found during the preshift or weekly examinations inasmuch as these examinations have separate recordkeeping requirements.

⁶⁹ Interview with Agapito Associates, Inc. Principal Michael Hardy, January 17, 2008.

- Philip Cox, foreman during the shift in which the March 11 bounce occurred, told the Committee that the bounce occurred just after he came on duty, and blew out several stoppings. He said he did not think it safe to send miners into the area to repair the stoppings. Mine manager Gary Peacock agreed, and they decided to seal off the North barrier pillar section.⁷⁰
- An email from Peacock to Adair and UEI President Bruce Hill on the day of the bounce make clear that “huge bounces” caused the mining shutdown:

From: Peacock, Gary
Sent: Sunday, March 11, 2007 2:50 PM
To: Laine, Adair; Hill, Bruce
Subject: crandall section move

Conditions in the pillar section have deteriorated to the point that I don't think it is safe to mine in there any longer. We are pulling the equipment out and setting up to mine south. The bad conditions consist of some huge bounces and the stopping line is no longer intact back in the bleeder entry. It is not safe to have people in there repairing the stoppings. I talked to Dave Hibbs this morning, he is looking into the possibility of not needing a new MSHA plan to mine south until we go past the seals. I realize pulling out early could change the way MSHA views the plan on the south side. I also realize we have used all the tricks we know of to pull these pillars and I no longer feel comfortable we can do it without unacceptable risk.

Exhibit 85.

- Peacock wrote in a March 2007 memo to Adair that “we were forced out of the pillar section [in the North barrier] on [March] 11th due to some significant bouncing...the bouncing intensified to the point that it was no longer safe to continue mining.” Exhibit 86.
- On May 16, the company submitted to MSHA an April 18, 2007 report from Agapito which stated that the company abandoned work in the North barrier of Crandall Canyon because of “a large bump” that resulted in “heavy damage.” Exhibit 84.

BLM Inspector Stephen Falk was called to the mine by Murray Energy engineer Tom Hurst on the 15th (four days after the bounce) to approve the company’s application to stop mining in the North barrier.⁷¹

- On the 12th (the day of the bounce), Hurst submitted an application to BLM requesting approval to stop “during retreat mining a bounce occurred, **compromising the bleeder ventilation system**. Ground conditions in the area **prevent economic recovery of the remaining pillars in the North Barrier** of Main West inby crosscut 118.” Exhibit 87.
- Falk visited the mine at Hurst’s request on the 15th, and noted that “[s]tress overrides out by the face were very concerning. The bounces had either

⁷⁰ Interview with Philip Cox, October 16, 2007.

⁷¹ Since much of the mine is on land leased from the federal government, BLM must approve all mine plans and changes in mine plans on those lands.

knocked out or damaged all the stoppings to the north bleeder entry from crosscut 132 inby to crosscut 149.” He could “**only travel the north entry to 143**, but the **observed conditions were severe**.” (emphasis added). Exhibit 88.

- Handwritten notes Falk took during that inspection confirm his report.

“Main West North Barrier bouncing bad”

“bounce 1st Thurs last week barred MRS”

“Sat big bounce **damaged vent[ilation]** at pillar [sic] 3 rows back”
Exhibit 89.(emphasis added).

- On the 15th, Falk gave Hurst verbal approval to stop retreat mining in the North barrier. BLM memorialized this verbal agreement in an August 20, 2007 letter, which makes clear that the bounce caused mining shutdown:

UtahAmerican [Energy, Inc.] reports adverse ground conditions with damaging bounces as justification for leaving the rest of the pillars. After sealing the North Barrier section, mining of the South Barrier will proceed.....In summary, the BLM agrees with UtahAmerican’s position to discontinue pillar extraction in the Main West North Barrier. **Excessive pillar loading at this depth of mining (approximately 2000 ft) has resulted in several bounces, leaving an unsafe area with no chance of continuing safe pillar extraction.** (emphasis added). Exhibit 90.

Documents uncovered by the investigation show that Murray Energy’s CEO, Robert Murray, was notified *the day of the incident* that a “significant bump” had occurred in the north barrier which caused mining to stop in that area. On March 12, UtahAmerican President Bruce Hill sent an email to Mr. Murray describing the bounce:

Mr. Murray,

As you know, Crandall has been pulling pillars in excess of 2,000 feet cover. Regular bumping has been occurring, but the pillar integrity was adequate for continued operations. Today, the section suffered a significant bump (no one was hurt) and the stopping line inby the face was destroyed. The conditions are too unstable to send men in to correct the problem without a massive, expensive effort. Consequently, the section is being pulled and moved to the south side of the mains. The section should be operating by the second shift on Monday. In total, we lost 11 crosscuts of pillaring. .

Exhibit 91.

In addition, minutes of a March 21, 2007 mine co-owners’ meeting, which Mr. Murray attended by phone, indicate that the March bounce was reported in detail during the meeting:

IPA / UEI Co-Owners Meeting, 3-21-07

Regular monthly IPA Co-Owners meeting, March 21, 2007, in IPA offices in South Jordan, UT.

In South Jordan: Reed Searle (RS), Lance Lee (LL), Bill Engels (BE), Bruce Hill (BH), BJ Cornelius (BJC), Karl Yoder (KY), Alden Whitehead (AW), Doug Johnson (DJ)

By phone: Bob Murray (BM), Rob Moore (RM), Eric Tharp (ET)

...

b. Earlier in the month the mine was pulling pillars in the panel on the north side of the West Mains. The mine started taking bounces and had to retreat the equipment very quickly. There were no injuries and all equipment was recovered out of the area. However, the mine lost the ability to walk the aircourse on the north side to the back of the panel, and we could no longer mine on north side of mains.

Exhibit 92.⁷²

This evidence clearly contradicts Mr. Murray's repeated assertions that he had no knowledge of the March bounce prior to the August 6, 2007 accident. For example, in an August 16, 2007 interview on National Public Radio, Murray was asked whether he was

aware of this memo that came out that indicated that there was a weakened section of that mine last March, just 900 feet away from this existing collapsed site, that experienced a bump or a bounce in which the support pillars actually collapsed. And you had to stop mining in that area temporarily. Is that true?

Murray responded:

I don't know. I don't know that. I'm hearing it for the first time. I can tell you that seismic activity, tectonic activity, rock mechanic activity underground occurs every day. They're not dangerous if you know how to do it, and we do it every day. I can tell you that the mine is in compliance with the law and approved by the Federal Mine Safety and Health Administration.

Exhibit 93.

These documents make clear that Murray Energy management – including its CEO – had detailed knowledge of the destructive force of the March bounce. Yet they opted to go forward with exactly the same mining operation just 900 feet away, in the South barrier pillar, without hesitation. The record shows that, even though Murray Energy asked Agapito to revise its analysis, company management had determined to mine the South barrier before the results of that revised analysis were in. For example, in an email to Mr. Murray the day after the accident, Hill writes that “the section is being pulled and moved to the south side of the mains. The section should be operating by the second shift on Monday.” Exhibit 91. For the company, mining the South barrier was a foregone conclusion – in spite of the near tragedy that had occurred just 900 feet away.

The record also strongly indicates that the March bounce was legally reportable, but the company failed to formally report and investigate the incident. The Code of Federal

⁷² The meeting minutes confirm that Mr. Murray was present on the call when this item was discussed.

Regulations requires a mine operator to “immediately contact the MSHA District Office” if “an accident occurs...The operator shall contact MSHA as described at once without delay and within 15 minutes.” [30 CFR 50.10] Regulations also require the operator to “investigate each accident” and “develop a report of each investigation,” as well as sending a written report to MSHA within ten working days. [30 CFR 50.11, 50.20-5.] The law clearly defines which categories of events qualify as reportable “accidents,” two of which are relevant here:

(h) *Accident* means

...

(8) an unplanned roof or rib fall in active workings that impairs ventilation or impedes passage.”

...

(9) a coal or rock outburst that causes withdrawal of miners or which disrupts regular mining activity for more than one hour. [30 CFR 50.2(h)]

From contemporaneous accounts, it seems clear that the March 11 bounce falls within at least one, if not both, of these categories.

The record shows that, immediately after the bounce, the company determined that conditions in the North barrier were too dangerous for continued retreat mining and decided to cease mining activities *permanently*. It is difficult to imagine a circumstance in which an event would more clearly fall within the meaning of 50.2(h)(9).

Two MSHA officials received notice of the March 11 bounce from Murray Energy officials shortly after the events unfolded. In both cases, company officials described the bounce as causing a shutdown of mining in the section, making the event reportable to MSHA under the law as described above. On March 12, Adair contacted Billy Owens to notify him of the bounce, and an unidentified Murray official left a voicemail for Bill Reitze (supervisory mining engineer, district 9 ventilation division) notifying him of the bounce.

- In a post-accident email to MSHA official Bob Friend, Owens writes that Adair told him on March 12 that the “mining crew decided there was **too much bouncing during mining of the pillar and they moving [sic] out of the area.**” (emphasis added). Exhibit 94.
- In Peacock’s email to Adair and Hill discussed above, Peacock writes that “I don’t think it is safe to mine in there any longer. We are pulling the equipment out...The bad conditions consist of **some huge bounces** and the stopping line is no longer intact back in the bleeder entry.” (emphasis added) [cite] Exhibit 85.

The record also shows that ventilation systems were impaired and passage was blocked within the meaning of law:

- The voicemail left for Reitze (supervisory mining engineer, district 9 ventilation division) stated that “a bounce had occurred and the **bleeder**

entry inby the face was not safe to travel,” and Adair reported to Owens on the 12th that “**the single bleeder to the back was pretty well beaten up.**” Exhibit 95. The bleeder entry is an integral part of the mine’s ventilation system – thus, when a bounce makes it unsafe to travel the bleeder entry, ventilation has obviously been impaired within the meaning of 50.2(h)(8) above, making the bounce reportable.⁷³

- A company safety report for the week of the bounce states that “areas from 131 inby not safe to travel. Dangered off.” Exhibit 96.

2. After the March bounce, MSHA missed warning signs and again relied on Agapito’s faulty analysis

a) Available Information Should Have Prompted MSHA to Investigate March Bounce

At the very least, MSHA should have visited the mine immediately after the March bounce in order to (1) determine whether the bounce was reportable (and thus whether the company should be cited for its failure to officially report it) and (2) assess the safety of continued mining in the South barrier pillar. MSHA officials have justified their failure to investigate on the grounds that the incident did not seem reportable or significant, given the company’s account. Such blind reliance on representations of the mine operator does not satisfy MSHA’s regulatory and monitoring obligations.

Owens maintained that, after Murray Energy official Laine Adair told him about the bounce, he did not have good cause to believe it was reportable and would later explain that he “took this conversation to indicate that the mine had made a reasonable judgment to back away form [sic] an area where they were having stability problems.” Exhibit 97. In an interview with the Committee, Owens reiterated that, based on how the situation was explained by Murray Energy, the March 2007 bump did not seem to him to be reportable.⁷⁴

When interviewed by the Committee on this question, district nine manager Allyn Davis could not articulate clear criteria for when an investigation into a failure to report was warranted. Davis told the Committee he was “not sure” whether the March bounce was reportable because he didn’t know whether the incident had interrupted mining for more than an hour. When asked how he decides to investigate whether Part 50 has been

⁷³ The “bleeder” or “bleeder entry” are air courses developed and maintained as part of the mine ventilation system and designed to continuously move air-methane mixtures emitted by the gob or at the active face away from the active workings and into mine-return air courses.” <http://www.archcoal.com/community/miningterms.asp>

⁷⁴ 30 CFR 50 *et seq.* requires a mine operator to, within 15 minutes, report certain kinds of accidents and injuries to the agency. Specifically, 30 CFR 50.2(h)(8) and (9) provides that among the reportable accidents is “a coal or rock outburst that causes withdrawal of miners or which disrupts regular mining activity for more than one hour” or “an unplanned roof or rib fall in active workings that impairs ventilation or impedes passage.”

violated, Davis responded that if the District feels an incident was reportable they will send someone to the site. Otherwise, no follow up will be made.⁷⁵

Put simply, this argument is circular. Obviously, without visiting the mine or otherwise fact-finding, MSHA has no way to determine whether or not a seismic incident is properly reportable. In this case, Davis and Owens appear to have simply relied upon the company's representations that the event was not reportable. Such reliance does not constitute vigorous oversight and safety monitoring. MSHA's failure to investigate the scene of the March bounce is even more inexplicable when it is considered that MSHA inspector Randy Gunderson was actually at the mine conducting a regularly scheduled inspection *two days after* the bounce – on March 13th.⁷⁶

In spite of the significance of this major seismic event, both Owens and Davis told the Committee that they did not consider the bounce relevant in reviewing the company's South barrier mining proposals.⁷⁷ Administrator of MSHA's Office of Coal Mine Safety & Health Kevin Stricklin, however, told the Committee that more information about the bounce would have been relevant to that review:

Senator Murray. Were you aware of the March 10th bump at Crandall Canyon that resulted in the abandonment of the North Canyon?

Mr. Stricklin. Not until after the accident occurred, after August the 6th.

Senator Murray. Would you have -- if you had have known -- reassessed the South Barrier roof plan?

Mr. Stricklin. Yes, we would have.

...

Mr. Stricklin. The one thing I want to mention to you is, I don't think my folks in MSHA knew of the extensiveness of this bounce, or bump that occurred in the North Barrier section.

Senator Kennedy. If they had, what would have been their recommendation?

Mr. Stricklin. I guess they would have probably dug into it further, and evaluated further. But, at the time our understanding was that they were pulling out of that section based on the fact they could not travel the bleeder entry, which is a ventilation course to the back of that area. And, we were unaware of the extensiveness of the bounce that we found out after this occurrence on August the 6th. Exhibit 99.

Similarly, former MSHA engineer and mining expert Bob Ferriter described the move from the North to the South barrier as a "red flag."

⁷⁵ Davis Interview.

⁷⁶ In response to questions from the Committee, MSHA Administrator for Coal Mining and Health Kevin Stricklin advises that "Inspector Gunderson stated that he was not told of, nor made aware of, the March seismic incident when he continued his inspection of the mine three days after the bounce occurred. Because of this, it was not noted in his inspection report." Exhibit 98. Gunderson issued a citation to the mine on March 13, indicating that he was at the mine *two* days after the bounce.

⁷⁷ Owens Interview, Allyn Davis interview with the Committee ("Davis Interview"), September 26, 2007.

Now, we know we had bumps in the North Barrier pillar, and we moved to the South. This, to me, is a real red flag, okay? We had the same geologic conditions in the South Barrier that we had in the North Barrier, we've had bumping in the North Barrier, we've made minor changes in the mining plan in the South Barrier, and then we went in there and started mining again. Exhibit 99.

b) MSHA Failed To Rigorously Test Agapito's Revised Work

The record shows that, after the destructive March bounce, MSHA failed to diligently review Murray Energy's hastily revised plans to mine the South barrier. Even though, as a company official noted in a memo to CEO Robert Murray, "MSHA [had] never allowed pillar recovery at this depth" and a massive bounce had just devastated an identical nearby area, MSHA did not (1) rerun the computer models used by Agapito, or (2) submit the plans to experts at the agency's Technology Center for review. Exhibit 2. In addition, MSHA failed to detect that important plan design changes had not been made to the mine ventilation plan.

After the March bump, Agapito reevaluated the company's South Barrier Pillar retreat mining plan. In emails to Murray Energy, Agapito engineers acknowledged the flaws in their previous work and the need to reexamine their assumptions. As described above, however, NIOSH found multiple flaws in Agapito's modeling and assumptions – flaws which MSHA engineers did not detect.

Internal documents show that Murray Energy exerted significant pressure on Agapito to issue a revised report quickly, since the company wanted to start mining the south barrier as fast as possible. In a April 2, 2007 email to a colleague, Agapito engineer Gary Skaggs writes:

Please be advised that the Genwal Crandall canyon mine pillaring project has to be top priority...this week. **Genwal is starting to pull pillars this week and they need the results as soon as they can get them.** Exhibit 100.

Internal Agapito emails show that the firm finished this revised analysis of South Barrier development and retreat mining in just over a month. On April 11, Agapito engineer Leo Gilbride emailed principal Michael Hardy that another engineer "completed the necessary modeling and I am just about to write up the results for Laine [Adair, General Manager of the mine.] The results were largely consummated by telephone with Laine last Friday, so he is already mining in the south barrier." Exhibit 101.

This email, as well as internal Murray Energy documents, show that the company had determined to mine the south barrier before Agapito had even completed its evaluation of safety. That is, Murray Energy never seriously considered refraining from mining the South barrier altogether.

On April 18, Agapito issued a revised report approving development and retreat mining in the South Barrier Pillar contingent on increasing the dimensions of the production pillars.⁷⁸ Specifically, the report recommended that the pillar size should be increased

⁷⁸ NIOSH distinguishes between "'production pillars' that are within the mining panel" and "'barrier pillars' that isolate individual panels from adjacent mined out areas." NIOSH reported that "AAI did not consider the importance of the remnant barrier pillar to the overall likelihood of the success of the mining

“from 80-ft by 92-ft to 80-ft by 129-ft. The added 37 ft length, approximately equivalent to an extra full cut, increases the size and strength of the pillars’ confined cores, which helps to isolate bumps to the face and reduce the risk of larger bumps overrunning crews in outby locations.” Agapito used LAMODEL to reevaluate the plan – ARMPS is not mentioned.⁷⁹ Murray Energy submitted its proposal for retreat mining in the South Barrier Pillar on May 16, 2007, providing the Agapito reports as technical support. Exhibit 102.

Owens told the Committee that he did not rerun Agapito’s computer model because the office did not have the capacity to do so.⁸⁰ However, in a post-accident email, Owens wrote MSHA colleagues that he “reviewed [Agapito’s] computer modeling” in connection with South Barrier mining plans. Exhibit 103. It is unclear what “review” Owens performed, given that he did not rerun the LAMODEL program that Agapito used to reassess the South Barrier plan in April. At the time Murray Energy’s mining proposals were being considered, the District 9 office did not have the AutoCAD software necessary to effectively use LAMODEL.⁸¹

Several MSHA interviewees told the Committee that they relied heavily on Agapito’s work. Owens told the Committee that, in his view, Agapito’s revised plan for the southern barrier sufficiently addressed issues raised by the March bounce. Owens said that the March bounce did not mean that Agapito’s coal strength values needed to be reassessed, and that the 1640 psi coal strength value used by Agapito is more conservative than many published reports on the Hiawatha coal seam (of which Crandall Canyon is a part). Based on the way in which Murray Energy dealt with the March bump and their decision to pull out from the north barrier, Owens felt that they would be similarly cautious when mining the south barrier. Owens also cited the Agapito firm’s experience and extensive mining knowledge as reasons for confidence in their work.⁸²

When asked why the MSHA district office did not submit the company’s plans, and Agapito’s supporting analyses, to MSHA’s Pittsburgh Safety and Health Technology Center Roof Control Division for review, Knepp stated that he and Owens discussed the possibility but concluded it would take too much time.⁸³ Owens similarly told the Committee that submitting the plans to Pittsburgh would take too long.⁸⁴

The Technology Center, headed by Joe Cybulski, is staffed by experienced engineers and mining professionals who could have carefully analyzed Agapito’s analyses with state of

in the North Barrier. The NIOSH interpretation of the case history database made clear that those successful designs with pillar SFs that were less than 0.90 also employed substantial barrier pillars. The AAI ARMPS results would have included a BPSF of 1.50 for the 210 ft barrier pillar they modeled...” Exhibit 5.

⁷⁹ The report notes that Agapito used the same LAMODEL parameters (e.g. coal strength) employed in the July 20, 2006 and August 9, 2006 evaluations of North Barrier retreat mining.

⁸⁰ Del Duca did not participate in the review of South Barrier mining plans.

⁸¹ Interview with Pete Del Duca, February 19, 2008.

⁸² Owens Interview.

⁸³ Committee Interview with Bill Knepp, February 26, 2008. (“Knepp Interview”)

⁸⁴ Committee Interview with Billy Owens, February 22, 2008.

the art technology. Regardless of whether review by the Technology Center would delayed the approval process, MSHA should have submitted the barrier pillar mining plans to the Center for review. Certainly, they should have had the Center review the revised South barrier pillar plan after the March bounce had devastated the North barrier. District manager Allyn Davis told the Committee that the office has no written guidelines or procedures for determining when to send a mining plan to the Technology Center, and he did not recall any discussions at the time about whether to seek the Center's input on Murray Energy's plans.

This lack of diligence is even more alarming when considered in conjunction with evidence that the company pressured MSHA to approve plans quickly, and MSHA responded to that pressure. On June 13, Crandall Canyon Safety Manager Jim Poulson emailed Owens about the plan for retreat mining the South barrier:

I am in a staff meeting right now and they are all asking when the plan for the pillaring in Crandall will be approved. **They are about 7 days away from needing the plan. I have a fire under my axxxxxx to get this approved. I need your help.** Exhibit 104.

The next day, in response to another email from Poulson, Owens replies that he "signed off on the pillar plan for Crandall today." Exhibit 104. Bill Denning, district manager Allyn Davis's assistant, signed the approval letter on behalf of Davis on the 15th.

From: Poulson, Jim
Sent: Friday, June 15, 2007 2:37 PM
To: Adair, Laine; Hibbs, David; Hill, Bruce; Hurst, Tom; Peacock, Gary; Allred, Bodee
Subject: FW: Crandall Pillar Plan roofcontrol

I talked with Billy on the phone about the plan and we will have to still get Al to sign the plan.

Jim

From: Owens, Billy D - MSHA [mailto:Owens.Billy@DOL.GOV]
Sent: Thu 6/14/2007 3:37 PM
To: Poulson, Jim
Subject: RE:

I signed off on the pillar plan for Crandall today.

Billy D. Owens
303-231-5590

-----Original Message-----

From: Poulson, Jim [mailto:jpoulson@coalsource.com]
Sent: Thursday, June 14, 2007 7:09 AM
To: Owens, Billy D - MSHA
Subject: RE:

How is the ass kicking contest going? Are you making any headway? Is there anything I can do to help you?

I am sure a man of your stature and noble ability will prevail. I will try to keep the wolves at bay over here and pray you are successful in your accomplishments. It is looking like we will need the approval before Monday.

Jim



James Poulson
Safety Manager
UEI
(435) 888-4011 work
(435) 630-1047 cell
jpoulson@coalsource.com

From: Owens, Billy D - MSHA [mailto:Owens.Billy@DOL.GOV]
Sent: Wednesday, June 13, 2007 10:59 AM
To: Poulson, Jim
Subject: RE:

Welcome to the one-legged man ass kicking contest!!

Billy D. Owens
303-231-5590

-----Original Message-----

From: Poulson, Jim [mailto:jpoulson@coalsource.com]
Sent: Wednesday, June 13, 2007 10:25 AM
To: Owens, Billy D - MSHA
Subject:

Bill;

Just a reminder, I am in a staff meeting right now and they are all asking when the plan for the pillaring in Crandall will be approved. They are about 7 days away from needing the plan.

I have a fire under my axxxxxx to get this approved. I need your help.

Exhibit 104.

Post accident emails from Del Duca also show that MSHA officials responded to company pressure in approving the plan.

They submitted us quite a bit of geotechnical analysis and we did on-site technical reviews and our own geotechnical analysis. **Initial reactions were to allow development only...which was successful without problems. That's what the geotechnical analysis that I did said. It came from higher up, after on-site evaluations, and more submittals from the company's consultants to allow them to pillar it.** I don't know, but I would guess that some people may retire early because of this. Exhibit 105.

In his interview with the Committee, Del Duca maintained that this email was not directed at a particular person or the result of a particular event. He said that the tendency for this to happen after mine disasters was what motivated his comments. While he acknowledged that the decision to approve retreat mining was made by his supervisors, he said he did not mean to imply that MSHA's approval was a result of anything other than the merits of the company's mine plans. However, he conceded that, at the time, he thought retreat mining in the South barrier pillar was a bad idea because of the bouncing that was occurring.⁸⁵

Finally, the record casts substantial doubt on Owens' and Knepp's post-accident explanation of their failure to submit the mining plans to the Technical Center for review – that such review would take too long. After the March bounce, district manager Allyn Davis “requested that Tech Support expedite the seal approval” for the North barrier. Exhibit 106. An email from Technology Center official John Fredland to Davis on March 13 confirms that Davis was pushing the Center – at the urging of Murray Energy – to approve of the seal plan quickly:

From: Fredland, John W. - MSHA
Sent: Tuesday, March 13, 2007 2:38 PM
To: Davis, Allyn C - MSHA
Cc: Reitze, William P - MSHA; Hoch, Terry - MSHA
Subject: Construction of Seals at Crandall Mine

Allyn,

As you informed me by phone this afternoon, Crandall Canyon Mine has experienced a bounce and has an urgent need to construct seals. You asked whether we could allow the mine operator to proceed with seal construction based on the same seal plan that has been provisionally approved for West Ridge Mine.

Exhibit 107.

The North barrier seal plan was submitted to the MSHA district office on March 14 and “provisionally” approved March 16. Exhibit 108. Another email from Fredland to Poulson shows that Davis was urging similar speed for approval of seals at Westridge, another Murray Energy mine. Fredland writes: “I’ve had several calls from Allyn Davis on the urgency on your situation.” Exhibit 109. In light of this swift approval, it is clear

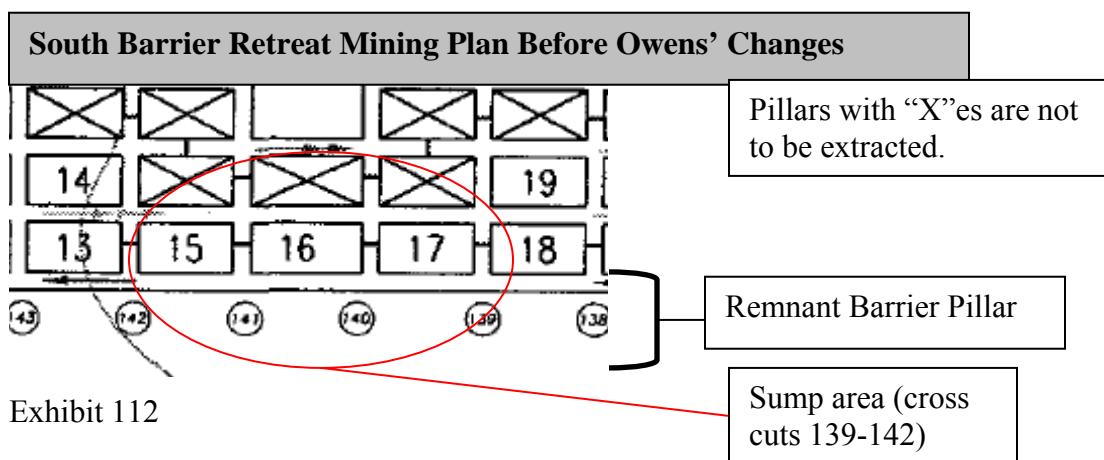
⁸⁵ Del Duca Interview.

that the Technology Center can move quickly when prompted – MSHA simply chose not to submit for review the roof control plans for the North and South barrier.

c) May 22 MSHA Site Visit; Owens’ Change to the Retreat Mining Plan

The only examination MSHA undertook of the South Barrier retreat mining plan was a May 22 site visit by Owens and inspector Gary Jensen during development mining of the South barrier (retreat mining did not begin until July 17). Exhibit 110. Owens and Jensen were accompanied into the mine during that visit by Adair, Peacock, and mine safety director Bodee Allred. In his post-accident written summary of the visit, Owens said he observed that “the ribs in the face were yielding as expected on development...the outby areas were quiet and the ribs had yielded as expected [and] the roof was well supported.” Owens told the Committee that, during the visit, mine officials told him that the conditions in the south barrier were better than those in the north.⁸⁶

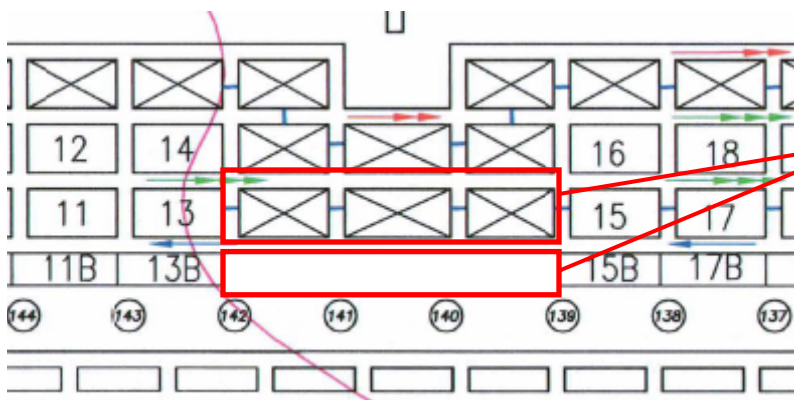
After the visit, Owens required the company to change to the retreat mining plan in two respects. First, he required that the plan be revised to leave eight pillars (rather than five, as the company proposed) to support the roof around a sump area⁸⁷ between cross cuts 139 and 142. Second, he prohibited the company from mining (or “slabbing”) the remnant barrier pillar in the same area. Crandall Canyon’s retreat mining plan provided for “slabbing” of the remnant barrier pillar south of the newly mined entries. This slabbing would have left a remnant barrier pillar of “about 97 ft wide (rib to rib),” according to Agapito’s reports. Exhibit 84. The company resubmitted the plan to reflect these changes, Owens approved it on June 14, 2007, and Davis signed off on it the next day (Davis’s assistant, Bill Denning, signed on his behalf). Exhibit 104.



⁸⁶ Internal company documents bear out this account. A May 2007 operations report states that “During May, MSHA Denver District 9 ground control specialist Billy Owens visited the section to observe mining conditions in the barrier at +2,000 feet of cover...The general consensus of the group which visited the section was that the larger pillars recommended by Agapito and Associates, Inc. are resulting in better rib conditions and fewer bounces on development.” Exhibit 111.

⁸⁷ A sump is a low-lying area in a mine where water is drained.

South Barrier Retreat Mining Plan Incorporating Owens' Change

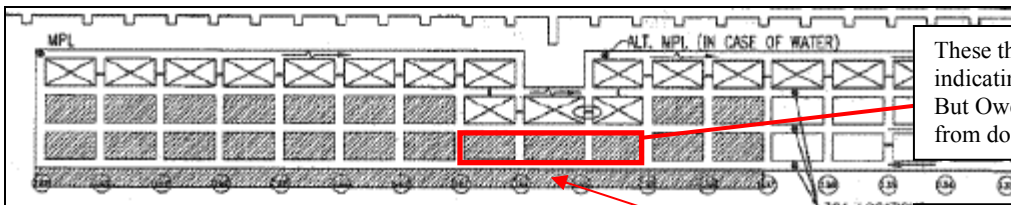


Owens required that three additional pillars not be mined and prohibited mining of the remnant barrier pillar south of the pillars.

Remnant Barrier Pillar

There was an important flaw in the revised roof control plan for the South barrier. Even though the retreat mining plan that was proposed on May 16 contained the Agapito report recommending an increase in the pillar length of 37 feet, the map submitted by Murray Energy showing the pillars to be extracted did not reflect that increase in size.

In addition, Owens' required amendment to the roof control plan was not made to the ventilation plan amendment addressing retreat mining in the South barrier. The mine map approved by MSHA's ventilation department on June 1, 2007 had two errors: (1) it showed only five pillars protecting the sump area and (2) it allowed mining of the remnant barrier pillar south of these pillar rows (between cross cuts 139 and 142). The roof control plan that Owens approved required the company to change both of these features – leaving eight pillars in the sump area and prohibiting mining of the remnant barrier pillar in the area.



These three pillars are shaded, indicating they are to be extracted. But Owens prohibited the company from doing so.

Similarly, the map allows for mining of the remnant barrier pillar between crosscuts 139 and 142. Owens prohibited this.

Exhibit 113.

Internal MSHA documents show that this error was not corrected. Exhibit 114.

Specifically, post-accident notes by William Reitze, supervisory mining engineer of the district 9 ventilation branch, state that the ventilation plan for the South Barrier allowed the remnant barrier pillar to be mined while the roof control plan prohibited it:

Root & Vent Plan - INCONSISTENT - Vent supposedly
allowed pulling of Barrier & Root did not

Exhibit 115.

CHRONOLOGY: MINING SOUTH BARRIER PILLAR

- February 20, 2007: Murray Energy submits proposal to development mine in South barrier pillar.
- February 27, 2007: BLM Inspector Falk visits the mine and reports he is concerned with pillar extraction plan.
- March 8, 2007: MSHA approves development mining proposal for South barrier.
- March 11, 2007: **Major bounce in North barrier during retreat mining.** Company ceased mining operations in the North barrier.
- April 18, 2007: Agapito issues revised analysis of South barrier retreat mining in light of March 11 bump. Report approves of retreat mining, contingent on lengthening pillars.
- May 16, 2007: Murray Energy submits proposal to retreat mine South barrier.
- May 22, 2007: Owens and inspector Gary Jensen visit the mine to observe conditions in the South barrier.
- June 15, 2007: MSHA approves retreat mining proposal for South barrier.
- July 17, 2007: Murray Energy begins retreat mining in South Barrier
- **August 6, 2007: Mine collapse** traps miners Kerry Allred, Don Erickson, Luis Hernandez, Juan Carlos Payan, Brandon Phillips, and Manuel Sanchez.

3. As in the North barrier, Murray had evidence of deteriorating conditions in the South barrier

As with the seismic events and incidents that preceded the March 11 bounce in the North barrier, many red flags signaling instability in the South barrier went unheeded. In approving the South barrier retreat mining plan, Owens relied on assurances by company officials that they would apprise him of all seismic events, roof falls, or other disturbances in the section.⁸⁸ As a result, when Owens and Knepp heard no negative reports from the mine operator during mining in the South barrier, they counted that absence of bad news as a factor counseling for approval of retreat mining.

In addition, Owens told the Committee that Adair, Peacock, and Gibbs told him that mining conditions in the south were better than those in the north.⁸⁹ Documents uncovered by the Committee investigation indicate that this was not the case. Internal company documents show deterioration in roof supports, seismic activity, and indicia of instability that the company was required to report to MSHA under the enhanced reporting regime imposed by Owens.

⁸⁸ Owens Interview, DOL interview with Owens and Knepp.

⁸⁹ Owens Interview.

a) South Barrier Development Mining

Internal company reports during development mining of the South barrier clearly show warnings signs of seismic activity and instability, increasing as mining approached the area of deepest cover. As with the North barrier, it is important to note that several reports during South barrier mining note good, stable roof conditions. For example, in March 2007, Peacock reported to Mr. Murray that “conditions were good all of the month” during South barrier development. Exhibit 116. Hill reported at an April 4, 2007 management meeting, during South barrier development that “conditions are looking better.” Exhibit 117. In a “Month End May, 2007” report to Adair, Peacock notes that “rib and roof conditions are noticeably better than they were on the North barrier. Much of the improvement could be attributed to the larger pillars.” Exhibit 118.

However, just as in the North barrier, documents show that conditions rapidly worsened as development neared the area of the deepest cover.

- In an April 27, 2007 staff meeting, Gary Peacock reported that “bouncing has started in the south panel” and the crew “may have [to] start retreating sooner than the end of the panel.” Exhibit 119. However, as with the North barrier, preshift reports contain no notation of bounces or bumps.
- Notes from an internal company management meeting on May 23, 2007 – a week after the company submitted its proposal for south barrier pillar retreat mining – reflect “deteriorating” conditions during development mining in the south barrier.

Management Meeting...Production:...Currently at xc-130 and under the deepest cover. Projects: Setting some beams and rock props in the 1st South bleeder entry where it is deteriorating. Exhibit 120.

- A May 2007 “General Manager’s Monthly Operations Report” describes “adverse roof conditions” in the South barrier.

OPERATIONS

The Crandall Mine produced as forecast during June, but less than budget. Production was slow due to adverse roof conditions and the need to take short cuts. The top 2 feet of the coal seam was high ash – the same as experienced during May. This resulted in

Exhibit 121.

- In a June 5, 2007 memo from Peacock to Adair requesting additional staffing for the mine reported “constant bumping and sloughing of the ribs.” Exhibit 9. Again, none of the May or June preshift reports describe seismic activity in the section.
- In a June 22, 2007 memo to Murray Energy CEO Robert Murray, UtahAmerican President Bruce Hill says that, while the “pillars appear to be in very good shape,” “several bumps are occurring” during south barrier development and ribs holding up the roof are deteriorating. Beside these comments, Mr. Murray has written “noted.” None of the June preshift reports describe seismic activity. Exhibit 122.

Crandall

- Crandall is [REDACTED] tons short of budget month to date. The variance is due to bad top and slowed bolting associated with the top and a belt problem (head roller) that cost 36 hours of production. In addition, we lost production due to dropping an entry for 1.5 x-cuts due to the top and the lost entry caused sequencing problems with the mining cycle. *noted*
- The area we are mining was identified as a ding area and we anticipated difficult mining in the area. The Peake model is not recognizing the ding area. *noted*
- We have mined beyond the deep cover and the pillars appear to be in very good shape. We have 16 days before pillaring begins. However, several bumps are occurring and the ribs show significant signs of sloughage. *noted*

Exhibit 122.

- Particularly telling are MSHA inspector Donald Durrant's post-accident notes reflecting a conversation with mine foreman Phillip Cox: "Phillip Cox stated this morning that when entries were being developed, it bumped and was 'heavy.'" Exhibit 123.⁹⁰

b) South Barrier Retreat Mining

Internal company documents indicate that pillar extraction in the south barrier began July 16. Exhibit 124. After retreat mining had begun, company reports continue to describe instability which increased as the mining crew retreats under the area of deepest cover.

- An August 3rd update memo to Robert Murray verifies that the company expected instability as they retreated under deep cover. Hill also writes that "significant sloughage is occurring" during pillaring:

- We are now pillaring and the conditions are favorable. However, we are 6 x-cuts from retreating into the heavy cover. The top remains good, but significant sloughage is occurring outhy the face. *noted*

Exhibit 10⁹¹

- Indeed, post accident notes by MSHA investigator Michael Gauna indicate that pillars in the south barrier were in bad shape, showing "stress driven" sloughage. Exhibit 125.
- Durrant also documented his observations underground just after the August 6 collapse, writing that "rib to pin spacing [is] questionable in numerous spots" and it "[a]ppears that bumping and shilling of pillars has been **ongoing**." Exhibit 123. In an interview with the Committee, Durrant confirmed that the pillars appeared to him to be undergoing bumps and bounces for a long period of time.
- A management meeting report describes problems with "a lot of floor heaving" four days before the fatal collapse

⁹⁰ In an interview with the Committee, Cox said he did not recall saying this to Durrant.

⁹¹ Handwritten notes are Murray Energy CEO Robert Murray's.

Aug 2nd was down all of night shift moving belt and power. It was the move around the 3 entry area, also **a lot of floor heaving that took a lot of clean up.** Exhibit 126.⁹²

- Just three days before the collapse, on August 3, internal safety reports note that a bounce occurred during or just before the night shift. Exhibit 127.

Only one of the bumps and bounces described above – an August 3rd report notes “diagonal stopping needs repaired [sic] (bounce)” – are noted in the mine preshift reports. Thus, while internal documents show that company officials were well aware of increasing instability and bump activity, these troubling developments were invisible to MSHA inspectors.⁹³

The record also shows that MSHA inspectors were, in some cases, aware of deteriorating conditions in the South Barrier. MSHA Inspector Jim Martin conducted a quarterly inspection at Crandall Canyon from May 30 through July 2, 2007. An internal company memo describes a “closeout conference” he held with Murray managers Allred and Peacock on July 2, 2006 in which he warned that the South Barrier was showing signs of deterioration:

Main West Section need to continue to keep an eye on the ribs...Mr. Martin express[ed] that he felt like **the safety department was stretched too thin** and employees here wear lots of different hats. Exhibit 128 (emphasis added)

MSHA inspector Barry Grosley, whose quarterly inspection was ongoing at the time of the accident, noted on July 18 (two days after pillar extraction began) that the roof was “unsupported” and there were problems with the “condition of the ribs.” Exhibit 129.

Finally, Durrant told the Committee that miner Dale Black had told him, prior to the accident, that “there was heavy bumping and there were days he had some concerns.”⁹⁴ Black later perished in the August 6 collapse.

The August 3, 2007 memo cited above from Bruce Hill to CEO Robert Murray indicates—in stark contradiction to his public statements after the August 6 collapse – that Mr. Murray was specifically aware of retreat mining in the South barrier just before the collapse. In that memo, Hill wrote to Murray that “We are now pillaring.” Exhibit 10. In his public statements after the collapse, however, Mr. Murray denied any knowledge of retreat mining just before the collapse.

- August 7, Press Conference

As -- and I want to emphasize -- the area where these men are is entirely surrounded by solid, firm, strong pillars of coal. There was no retreat mining in the immediate vicinity of these miners. They're totally surrounded by solid coal, pillars that were left from the first mining.

- August 16, National Public Radio Interview, 4 PM EST

REPORTER: Well, let me clarify another point, and that is were these miners engaged in so-called retreat mining where...

⁹² Floor heaving is a phenomenon often associated with high levels of stress during retreat mining.

⁹³ Some reports note loose ribs and blown out stoppings – for example, the July 21 preshift report notes “4 stoppings blown out” in the Main West section. However, none mention bump or bounce activity.

⁹⁴ Interview with Donald Durrant, October 10, 2007.

Mr. MURRAY: No, they were not. There are eight solid firm pillars around the miners where they were mining. They had previously been involved in retreat mining, which is approved by the government and the engineering firms that we use. But we were not doing retreat mining at the time of the accident.

...we had stopped retreat mining. And in this area, we're just doing a first mining only.

4. MSHA set itself up to fail to properly monitor conditions at Crandall Canyon by entering into an improper agreement with Murray Energy

Despite the gravity of the March bounce in the North barrier pillar, Crandall Canyon Mine officials failed to formally notify MSHA. The record strongly suggests that the law required the company to report the incident. Certainly, under the enhanced monitoring requirements that Owens imposed on the company in late 2006, MSHA should have immediately conducted an on-site inspection and seriously reevaluated the company's plans to mine in the South barrier. However, MSHA neither cited Murray Energy for failing to formally report the bounce, nor conducted an on-site inspection of the bounce's aftermath.

A possible – and inexcusable – reason for this reporting failure was a tacit agreement between Murray Energy and MSHA to excuse the company from the Mine Act's reporting requirements. In May 2006, MSHA officials Ted Farmer and Bill Taylor entered into an informal agreement with Murray Energy official Adair that MSHA would relax the reporting requirements for seismic events:

Meeting was held at the Price field office with Ted Farmer and Bill Taylor in relation to the bounces and the reporting of such as referred to Part 50.2 (h) and the definition of accident as it occurs on the longwall face. A consensus of the group was if the bounce occurs and it basically, does not cause harm to personnel then the reporting of the event does not need to be done. Discussion was also held on the use of the CSE and the leather pouches used at all operations. The final outcome is still pending.

Exhibit 130.

This agreement is an abdication of MSHA's regulatory responsibilities. MSHA has no authority to carve out special exceptions from the law – which is exactly what was done here. Under this agreement, MSHA excused Murray Energy from following laws that require a mine operator to immediately report any “a coal or rock outburst that causes withdrawal of miners or which disrupts regular mining activity for more than one hour.” [30 CFR 50.2(h)] MSHA rewrote the law for Murray Energy, requiring it to report a bounce only if an injury resulted, a much more permissive standard.

The implications of this undisclosed agreement are significant. Since MSHA excused Murray Energy from reporting bounces as required by the law, we will never know –

except through review of the company's internal documents – exactly how many bounces actually occurred during mining of the barrier pillars. While the agreement as recounted in the memo discusses accidents “on the longwall face,” Adair’s memo also states that their agreement covered reporting under “Part 50.2(h),” which covers accidents caused by bounces. Even a review of the company’s documents may not give a complete picture of instability and seismic activity in the mine, since the company’s incentive to accurately track and record such activity was significantly diminished by the improper agreement described above.⁹⁵

It is possible that the effect of this improper exception was mitigated by the heightened reporting regime Billy Owens imposed on the company in early 2007. Whether Murray Energy failed to report the March bounce because of the illegal exception granted them by Farmer and Taylor, or for some other reason, the fact remains that the agreement was improper and certainly raises doubts about the completeness of the company’s reports.

III. EVIDENCE INDICATES THAT MURRAY ENERGY VIOLATED THE PLAN, MAKING A BAD SITUATION WORSE

It is impossible to know to a certainty what happened in the moments before the August 6th collapse. However, the investigation has uncovered evidence indicating that, at the time of collapse, the company was conducting unauthorized mining. As described above, MSHA roof control supervisor Owens required the company to amend the South Barrier retreat mining plan to prohibit mining of the remnant barrier pillar between crosscuts 139 and 142.

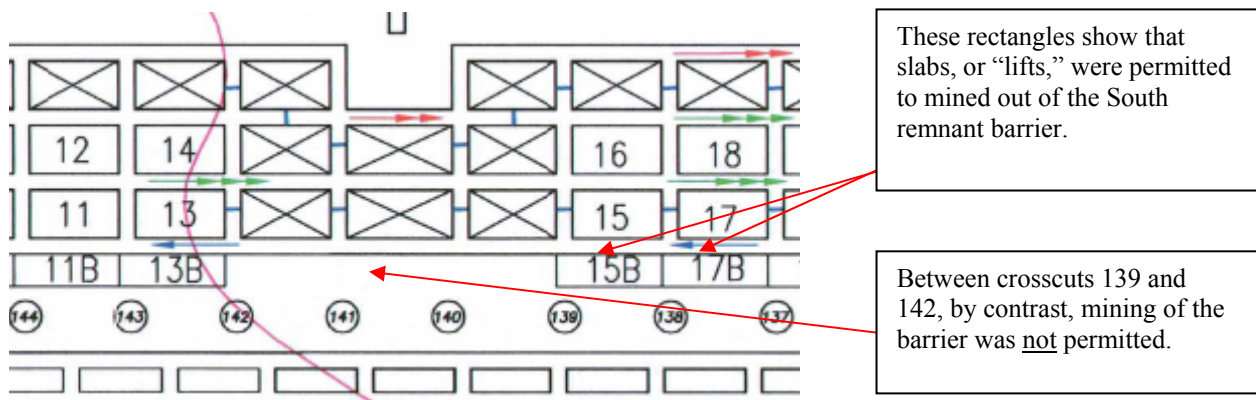


Exhibit 131.

In addition, mining of floor coal in the South barrier was not permitted by the approved roof control plan. Documents uncovered by the investigation show, however, that, at the time of the August 6 collapse, Murray Energy was violating both of these prohibitions.

MSHA assistant district manager Bill Knepp told the Committee that he received an anonymous call from a Crandall Canyon miner shortly after the accident who described how the company was conducting unauthorized mining. The caller told Knepp that the

⁹⁵ In a February 20, 2008 interview with the Committee, Taylor said he had no recollection of this meeting or agreement.

company was mining bottom coal – which was prohibited by the mine plan and weakens pillars – and that the company had been taking slabs out of the remnant barrier pillar at crosscut 140, where Owens had prohibited the company from doing so.⁹⁶

The whistleblower described two violations of the mine plan: (1) mining floor coal during retreat mining, and (2) extracting coal from the remnant barrier pillar where the company was prohibited from doing so. The documentary record backs up the whistleblower’s account on both points.

A. Unauthorized Mining of Floor Coal

According to MSHA supervisor Knepp, “Mining of the floor coal was not approved and was never discussed as part of the pillaring plan.” Exhibit 132.⁹⁷ District 9 Manager Allyn Davis also told the Committee that, unless floor coal mining is explicitly addressed in mining plan submitted to MSHA, it is prohibited.⁹⁸ Yet internal company documents and notes taken by MSHA personnel just after the accident show that Murray Energy was mining bottom coal during retreat mining of the North and South barriers.

A March 2, 2007 internal email between Murray Energy employees also explicitly states that the crews were mining “bottom coal” during retreat mining of the North barrier:

<p>From: Vasten, Shane Sent: Friday, March 02, 2007 12:34 PM To: Hurst, Tom Subject: Answers</p> <p>Tom,</p> <p>Sorry I had left for the day before getting your message. Here is the short version for now. Get ahold of me later if you need more info. I will try to answer your questions the best I can:</p> <p>1- Yes the maps have been updated. I am guessing you have found that out by now.</p> <div style="border: 1px solid black; text-align: center; padding: 5px;"><p>Redacted: Not Responsive</p></div> <p>3- The average height of 10' actually came from one of the shift foreman and one of the section bosses at Crandall. They both said they are taking quite a bit of bottom coal when they are retreating. I forgot to have Gary confirm that yesterday but if either one of us talked to him about it, I am guessing he would as well be in that neighborhood.</p> <p>Again, if you would like to discuss this further, give a ring at Tower when you get this.</p> <p>Shane</p>
--

Exhibit 133.

According to Allyn Davis’ post-accident notes, company official Gale Anderson told Davis that the company was mining “bottom coal” from crosscuts 139 to 141 and “inby 140”:

⁹⁶ Committee Interview with Bill Knepp, February 26, 2008.

⁹⁷ “Floor coal” or “Bottom coal” is simply coal mined from the floor of a tunnel. Knepp confirmed that mining of floor coal is prohibited, unless explicitly authorized, in his February 26 interview with the Committee.

⁹⁸ Interview with Allyn Davis, February 14, 2008.

8-18 1:30 meeting
Gale:
Were taking bottom
only ~~140~~ on #1 entry
Thinks from production
that they got started
taking left out of
banier
Dale left ~ 10:00 pm

Pulling 4 to 5 feet
of bottom coal
only 139 towards 141

Exhibit 134.

Davis told the Committee that these notes reflected his conversation with Anderson on August 18 at the mine in which Anderson said he had seen the continuous mining machine mining "bottom coal" at crosscut 140 about two or two and a half hours before the fatal bounce.⁹⁹

Most conclusively, reports to CEO Robert Murray indicate that floor coal was being taken throughout the retreat process. For example, on August 3, it was reported to Murray in a management meeting that:

⁹⁹ Interview with Allyn Davis, February 14, 2008.

- The conditions are very good right now, we are getting a lot of good floor coal and 85%+ of recovery on the pillars. The cave is good and high and staying right with us for the most part. We will be starting the cave over again after leaving the 3 rows, this next week will be critical to get the maximum out of each pillar to start a good cave.

Exhibit 135.

After the accident, Adair told MSHA inspector Farmer that the company was mining floor coal, even though the roof control plan prohibited it. Davis also told the Committee that Adair told him that floor coal was “often” mined at Crandall Canyon.¹⁰⁰ Mining bottom coal reduces the amount of weight pillars can hold by making the pillars taller.

Several miners interviewed by the Committee who worked in the south barrier said that they understood mining of floor coal to be permitted.¹⁰¹ This indicates that Murray Energy management instructed crews to extract floor coal, knowing it was prohibited.

B. Unauthorized Mining of the Remnant Barrier Pillar

During his post-accident investigation, MSHA investigator Michael Gauna spoke with miners who were in the area just before the accident. Gauna’s notes of the conversation show that the crews told him that “in [the] area when pillars were to remain near sump, lifts¹⁰² were taken out of the South Barrier separating panel 13 and the pillar section.” In an interview with the Committee, Gauna confirmed that the crews told him they were “slabbing” the remnant barrier pillar in this area – precisely the area where Owens prohibited the company from mining.

¹⁰⁰ Interview with Allyn Davis, February 14, 2008.

¹⁰¹ Josh Fielder Interview, October 15, 2007; Jesse Gordon Interview, November 1, 2007 (Gordon also confirmed that the crew was mining floor coal); Gale Anderson, November 1, 2007 (Anderson confirmed that the crew was mining floor coal during South barrier retreat mining, and said he had “never heard anything” about such a practice being prohibited.)

¹⁰² A “lift” is mining term for coal extracted by a continuous mining machine.

7. Pillar extraction occurred as projected at.

However, in area where pillars were to remain near Sump lifts were taken out of the South Barrier separation Panel 13 & the pillar section. Only limited mining. No left lifts were taken at the intersections where the MRS were pushed against the breaker row.

8. Bump occurred after ≈ 2 lifts cut at the new pillar line at Xcut 139.

S1.3 0003777

Exhibit 136.

Company electrician Tim Harper told MSHA roof control supervisor Owens that, just before the accident, the miners were "mining into [the] barrier at [crosscut] 139."

HARPER	at xc 35	3 RD NORTH	talked to section
ELECTRICIAN TIM HARPER	at xc 35	3 RD NORTH	talked to section
C. MINER	was	MINER	was mining into barrier @
	XC @ 139	2:00 AM	
Jamison WARD	was	on section	→ @ 2:50 AM @
	@ XC 107		

Exhibit 137.

Similarly, the rescue log reflects a conversation between the author and Harper, who spoke with another electrician that was near the scene at the time of the accident. Harper states that "the crew was mining off the #1 entry at xcut 139 into the barrier" just before the accident.

7:40 AM Met with Tim Harper, Jameson Ward, and Brian Pratt. Tim Harper (Electrician/mechanic) normally worked from 5 AM to 5 PM. Tim stated that at 2 AM on 8/6/07 he was at the mouth of 3rd North (Xcut 35). He finished his work in the area but couldn't leave because his pickup would not start. He called Jameson Ward (section Electrician) on the main West Pillar Section and asked him for a ride. Jameson stated that he had been setting a breaker row and the crew was mining off the #1 entry at Xcut 139 into the barrier. Jameson left the section and traveled outby to Xcut 107 at about 2:50 AM. Jameson had last communicated

Exhibit 138.

MSHA official Terry Bentley's notes also reflect that Murray Energy was illegally mining the remnant barrier pillar just before the accident:

(stopping)
Bill Taylor indicates they were mining the barrier block
towards the L.W panel (Scale 6)

Exhibit 139.

CONCLUSION

The Committee's investigation shows that, had Murray Energy and MSHA exercised appropriate care in formulating and reviewing the plans for mining the barrier pillars in Main West, the tragedies of August 2007 might have been avoided. There are multiple points at which a cautious approach could have prevented, or greatly reduced the risk of, the collapse that eventually occurred.

- In formulating the plan, Murray Energy and its technical consultant, Agapito Associates, failed to make sufficiently conservative engineering assumptions and ignored the history of the mine's instability. Had they been cautious and conservative, the company may have scaled down the plan, or perhaps done away with it entirely. Instead, they rapidly pushed it ahead.
- MSHA missed significant flaws in Agapito's analysis, dismissed critical findings by MSHA's own engineer, and did not submit the plans – which proposed one of the most hazardous mining operations ever attempted – for review by MSHA's expert technical staff. Had they been exacting and cautious in their review, MSHA may have significantly modified or refused to approve the plans. Instead, MSHA approved the plans with minor changes.
- In the North barrier, Murray Energy ignored substantial evidence of instability during mining operations, continuing to extract coal despite mounting evidence of danger. The company could have taken the time to notify MSHA of these conditions, stop mining, and reassess the risks. Instead, they continued mining until stopped by a powerful, nearly tragic, bounce.
- MSHA also ignored red flags during mining that should have prompted an exacting and cautious review of mining operations – the most obvious being the March bounce that closed the North barrier. Had they thoroughly investigated the March bounce, closely monitored conditions thereafter, and rigorously reviewed the company's revised plan for the South barrier, MSHA may have required greater safety precautions or prohibited mining in the South entirely. Instead, MSHA allowed the company to continue.
- In the South barrier, Murray Energy encountered – and ignored – instability similar to that encountered in the North. Again, they did not take the time to report to MSHA and reassess, but continued mining, retreating under deeper cover.
- Finally, the record strongly suggests that the company was conducting unauthorized mining at the time of the accident.

Because of these failures, miners were exposed to unnecessary and extreme risks. The mine operator and MSHA must be held accountable for their failures of diligence, care and oversight. The Secretary of Labor should refer the case to the Department of Justice for prosecution.

The policy recommendations set forth in this report are intended to guide the Congress and the Secretary of Labor in shaping statutory and regulatory solutions to the problems identified by the investigation. It is the Committee's hope that both Congress and the executive branch will move swiftly to protect those who work in the most dangerous conditions.